THE

CANADIAN

Naturalist & Geologist,

AND PROCEEDINGS OF THE

NATURAL HISTORY SOCIETY

OF MONTREAL.

CONDUCTED BY A COMMITTEE OF THE NATURAL HISTORY SOCIETY.

VOL. IV. JUNE, 1859. No. 3.

Montreal:
E. DAWSON & SON, No. 23, GREAT ST. JAMES STREET,
LONDON: SAMPSON LOW, SON & Co.

PRINTED BY JOHN LOVELL, MONTREAL.

Price Three Dollars per Annum, in Advance.

THE

Canadian Naturalist & Geologist.

This Magazine will appear bi-monthly, and be conducted by the following Committee, appointed by the Natural History Society of Montreal :—

J. W. Dawson, LL.D., F.G.S., *Principal of McGill College.*
T. Sterry Hunt, A.M., *Chemist to Geological Survey of Canada.*
E. Billings, *Palæontologist* " " "
David Allan Poe, Esq. Rev. A. F. Kemp.
A. N. Rennie, Esq.
W. H. Hingston, M.D., *Corresponding Secretary.*
John Leeming, Esq., *Recording Secretary.*

☞ All business communications to be addressed, *prepaid*, to the Publishers. Articles and communications for the Journal may be addressed to the Editors, care of the Publishers.

☞ Authors of original articles can have 12 copies of them by giving timely notice; it is too late when the forms are broken up.

☞ The next number of this Journal will be published in August 1859.

THE

CANADIAN

NATURALIST AND GEOLOGIST.

VOL. IV. JUNE, 1859. No. 3.

ARTICLE XI.—*On the Microscopic Structure of some Canadian Limestones.* By J. W. DAWSON, LL.D., F.G.S., &c.

[Read before the Natural History Society of Montreal.]

Geology has shewn that over a great part of the earth's surface we can say, almost without hyperbole, "The dust we tread upon was once alive." Great and very extensively distributed beds of rock are of organic origin, made up of the remains of the hard parts of animals, and these often of very minute dimensions. In the bed of the sea, more especially in the coral regions of the Pacific, the Indian ocean and the equatorial Atlantic, such deposits are now manifestly in progress on a large scale; and in the archepelagos of the Pacific, the Bermudas, and the peninsula of Florida, we have examples of these modern formations elevated into land. Similar phenomena exist on a still greater scale in the Tertiary rocks; as for instance in the Nummulitic limestones, extending from the west of Europe almost continuously into India, built up into mountain masses in the Alps, Pyrenees, Carpathians and Himmalayas, and furnishing the materials of the Egyptian Pyramids, and of thousands of humbler structures. In the secondary period, the chalk and many of the oolitic limestones present similar phenomena. Similar organic rocks occur in all the members of the palæozoic series down to the lowest Silurian; and in these earliest periods of the earth's geological history, when organic

life was perhaps young on our planet, the quantity of organic materials thus piled up into rock appears to have been as great as at any subsequent time. Of this some of the silurian limestones of Canada, and more especially the "Trenton Limestone," afford good illustrations, to which I desire in the present paper to direct attention; with the object, not of adding to the knowledge of their fossils, which have been so amply and ably illustrated by Prof. Hall and Mr. Billings, but of noticing the manner in which fragments of these fossils have been accumulated and cemented together into great beds of limestone.

The lowest of the silurian beds of Canada, the Potsdam sandstone, is wholly arenaceus, though with a few fossil remains. The Calciferous sandstone has a greater quantity of calcareous matter and more numerous fossil remains. The succeeding beds, the Chazy, Birds-eye, Black River and Trenton Limestone, are as a whole, of organic origin, and made up of more or less comminuted fragments of shells, corals, and crinoids, occasionally mixed or alternating with deposits of earthy matter. Above these limestones the Utica Slate consists mainly of muddy or earthy matter, and in the Hudson River group there are frequent alternations of earthy matter with organic limestones. It thus appears that in Canada, the head quarters of lower silurian limestone of animal origin, is in the central members of the group, which, according to Sir W. E. Logan, have near Montreal a thickness of nearly four hundred yards, though much thinner in the western part of Canada, as for example in Lake Huron, where Mr. Murray estimates their thickness at only one hundred yards.

Perhaps the most continuous and fossiliferous of all these limestones is that named by the geologists of New York, from an excellent exposure at the waterfall of that name, the Trenton Limestone. It is largely developed in the vicinity of Montreal, and is thus described by the Provincial Geologist, as it occurs in the quarries near the Mile-end road. "In the vicinity of Montreal the lower part of the Trenton formation holds massive beds of gray granular limestone, from which a very large amount of the best building material used in the city has been obtained. The quarries opened on them extend obliquely across that portion of the Côte de la Visitation road, which is southward of the Papineau road, their general direction in respect of one another being about North and South. The beds vary in thickness from three inches up to three feet, and present an aggregate of from

eight to twelve feet. In successive quarries, from the one to the other of which the beds can be traced with considerable certainty, individual beds appear occasionally to change in thickness, a massive one gradually dividing in the strike into two or more, or several thin layers uniting into a solid mass. Slight changes in the color also occur, giving shades of lighter and darker gray."

This gray granular crystalline stone, the texture of which we may see by picking up a chip at any mason's shed in Montreal, is wholly an organic rock, consisting of the hard parts of marine animals, in a fragmentary condition. In some specimens, joints of those curious stalked star fishes, the crinoids or stone lilies, predominate. In others a little branching coral, the *Monticulipora dendrosa* of Mr. Billings, but ranked as a variety of the *Chaetetes lycoperdon* by Hall, is more plentiful. In others, creatures of higher organization than the true corals, the Polyzoa, have contributed countless fragments of a delicate structure, which may often be seen spreading over the limestone in flat branches, marked with little holes or cells like perforations of pins, and belonging to the genus *Stictopora* of Hall,* probably the Ptilodictya of the European Paleontologists. The limestone does not merely contain these organisms; it is made up of them, sometimes entire or in large pieces, but more frequently in minute fragments from one tenth to one hundredth of an inch in size. Its present solid condition is due to clear transparent calc-spar or carbonate of lime, deposited by water in the interstices and cavities of the fragments, like the "congealed water" of Bermuda or the stalagmite of limestone caverns. This substance being perfectly crystalline, has given its own character to the mass, which thus breaks like marble with multitudes of shining surfaces. Under the microscope, however, the true character of the material becomes at once apparent, and the animal fragments, rendered distinct by the remains of their organic matter in a carbonised condition, are seen immersed in the transparent calc-spar, like pieces of potted meat in animal jelly.

To prepare the specimens for the microscope, it is necessary only to select thin fragments, polish them smooth on one side, then attach the smooth surface by any transparent cement to glass, and grind down the opposite side until the limestone is reduced to a

* Especially *S. Acuta*.

thin transparent film. A low power is sufficient to show the general forms and nature of the fragments, but they are often so beautifully preserved as to display their most minute structures when examined with high powers.

With the view of ascertaining whether there is any difference of material in different parts of the beds, I selected from one of the quarries, containing two thick beds with some intervening and overlying thin shaly layers, specimens representing the overlying shaly limestone, the material between the two beds, and the upper, middle, and lower portions of each bed. Duplicate preparations of all these specimens were kindly made for me by Mr. E. Murphy, of this city; and on being examined they afforded the following results:—

1. Above upper bed.—Very small fragments of crinoids and shells with numerous minute and probably young univalve and bivalve shells, in patches in a paste containing black earthy and organic matter.
2. Upper part of bed A.—Principally joints of crinoids; some fragments of corals, especially Ptilodictya and Monticulipora, and shells.
3. Middle of Bed A.—Similar to the last but more corals.
4. Bottom of bed A.—A still greater proportion of Ptilodictya and Monticulipora.
5. Between A. & B.—Crinoids and Monticulipora in about equal proportions, some Ptilodictya.
6. Upper part of bed B.—Similar to last, but still more corals.
7. Middle of B.—Principally Monticulipora and Ptilodictya, but still many crinoids.
8. Bottom of B.—Almost wholly Monticulipora and Ptilodictya.

It thus appears that the only material difference in these specimens is the great prevalence of crinoids toward the top, and of corals and Polyzoa toward the bottom. It is proper to add that, though the families and genera named above largely predominate, there may be detected in any specimen fragments of shells of brachiopods and gasteropods, and of corals of other genera than those named, though in comparatively small quantity.* With the exception of the first specimen, none exhibited more than traces of earthy or aernaceous matter.

The fine grained earthy limestone, marked No. 1, and which,

* According to Mr. Billings, Cystideans have also been important contributors; but in my examinations their remains are not distinguished from those of the Crinoids.

like the overlying dark limestones, is not used for the more important building purposes, must have been, when recent, a chalky rock, made up of very minute fragments of shells and corals; but it has been blackened by the carbonization of its organic matter, and hardened by the penetration of a calcareous cement; still its general structure under the microscope is not dissimilar from that of chalk. It contains multitudes of minute unbroken shells, some of which have much the aspect of foraminifera, as may be seen in Fig. 1; but they may possibly be univalve mollusks. I

Fig. 1.—*Earthy Trenton Limestone, Montreal,* (20 *diams.*)

hope, however, by the examination of a larger number of specimens, to determine whether minute foraminifera really occur in these ancient beds.

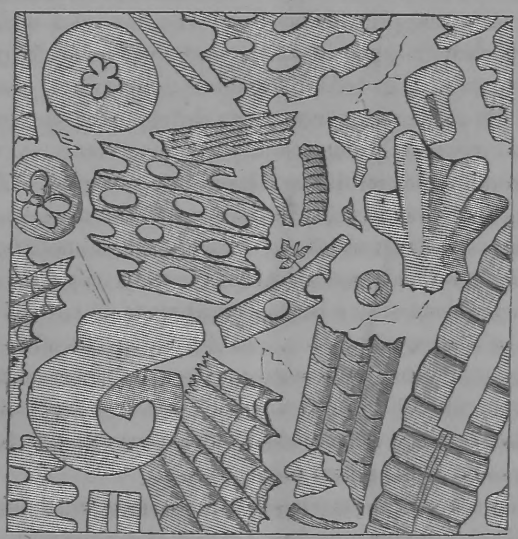


Fig. 2.—*Crystalline Trenton Limestone, Montreal, horizontal section,* (10 *diameters.*)

In the coarse grained variety the materials are somewhat loosely placed, and in a horizontal section like Fig. 2, may appear quite

disconnected, but in a vertical section they are seen to rest upon one another, and sometimes to be very closely packed, as in Fig. 3, in which translucent fragments of crinoids are seen to be

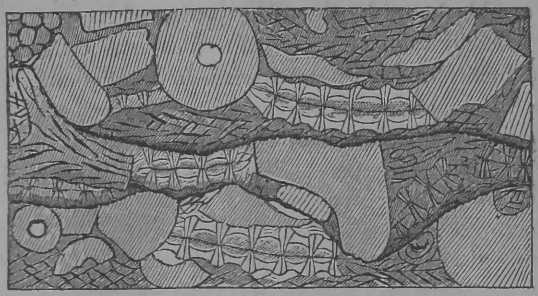


Fig. 3.—*Trenton Limestone, Montreal, vertical section,* (10 *diams.*)

packed in broken corals, chiefly Ptilodictya, and the irregularity of the planes of deposition is marked by two slender bands of fine black earthy and organic slime.

The beds of this remarkable organic limestone are usually very uneven on the surface—the smaller beds very much so; and on these surfaces there often appear quantities of Monticulipora and Ptilodictya in a perfect state, as well as occasionally Brachiopoda, Orthoceratites and Trilobites. Between the beds occurs a black shaly material consisting principally of clay and fine sand, darkened by carbonaceous matter, and containing more or less of fragments of shells and corals. The beds of organic fragments now constituting the gray limestone, must have been drifted over the bottom by strong and apparently somewhat irregular currents, in which in every favorable spot corals fixed themselves and grew. The black shale appears to have settled in the form of fine mud, which often coats over, as with a varnish, the surfaces of the limestone and the fossils lying on them; and which has usually only partially filled up the depressions of the surface, previous to the deposition of a new bed of the grey limestone. In the upper part of the Trenton formation at Montreal, the earthy matter so far prevails that the limestone becomes black and compact, and is interstratified with much shale, but it still contains numerous organic fragments, which in some beds become predominant.

The Trenton and its associated limestones are widely distributed rocks. Their outcrop runs from Quebec along the north shore of the St. Lawrence to Montreal—then southward through the valley of Lake Champlain into New York, where it skirts the Azoic region of the Adirondack, and returning northward along the

valley of the Black river, re-enters Canada at the lower end of Lake Ontario, along which these limestones extend in a broad band, and crossing to Lake Huron stretch along the chain of the Manitoulin Islands, and then run again to the southward along the west side of Lake Michigan. There are also in Canada outlying patches on the Ottawa and Lake St. John. Throughout all these regions the gray crystalline beds are more or less represented; though in the State of New York they appear to be in the upper part of the formation, and to thin out and disappear toward the South.* Specimens from Chateau Richer below Quebec, from Ottawa, from the La Cloche mountains, and from great Manitoulin Island, exhibit very nearly the same microscopic characters with those of the Montreal quarries. In the stone of Chateau Richer crinoids predominate. In that of Ottawa there is a greater prevalence of fragments of shells. In that of La Cloche and Manitoulin the materials are much the same as at Montreal.

The conditions of the accumulation of this great and extended mass of animal fragments, it is not difficult to understand. An ocean area, probably not of great depth, the growth of multitudes of branching corals and crinoids, the destruction of these by the waves and by the death of successive generations, the drifting of their remains by currents over the bottom, the occasional invasion of the clear water by muddy sediment—these are the conditions which must have prevailed when the gray Trenton limestones were formed. Professor Hall and Mr. Billings have remarked that the Brachiopod shell-fish of the Chazy and Trenton are usually of smaller size than that which they attain in overlying formations. This may have been due to the conditions so favorable to the spreading of organic fragments over the sea bottom.

In the Island of Montreal the Black river and Chazy limestones crop out from beneath the Trenton. The quarries at Pointe Claire, worked for the Victoria Bridge, are believed by Sir W. E. Logan to represent principally the former. The western or back quarries on the Mile End road and those of Isle Jesus belong to the latter. The stone worked for the piers of the Victoria Bridge presents several varieties in alternate layers. One of these has the coarse crystalline aspect of the gray Trenton, but it consists principally of fragments of Brachiopodous shells; masses of coral however occurring in some layers. A finer variety which constitutes a large proportion of the stone, is made up of rounded and comminuted

* See Geological Surveys of Canada and New York.

fragments of shells and crinoids, which, like the fragments of some of the modern limestones of Florida, bear evidence of the rolling action of the surf or of strong currents. Another variety is fine and compact like the upper part of the Trenton at Montreal, and shows a homogeneous calcareous and earthy paste filled with fragments of shells, crinoids, and corals. Figs. 4 and 5 represent the

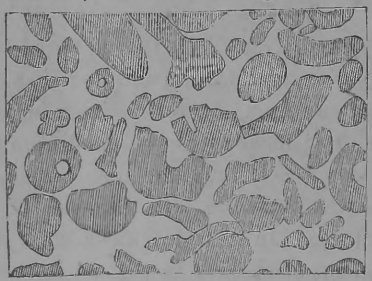


Fig. 4.

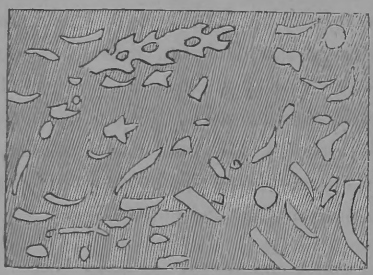


Fig. 5.

Figs. 4 & 5.—*Limestone from Pt. Claire Quarries*, (10 *diams.*)

two last varieties, and may be taken as fair specimens of the material of the piers of the great railway bridge, which solid and durable though they are, are composed of shelly fragments, that once drifted like snow before the ocean currents. The Chazy limestone of Isle Jesus is characterised by Sir W. E. Logan, as "a cemented aggregation of organic remains." I have not examined this stone, but that of the same formation in the vicinity of Montreal, consists almost entirely of broken brachiopodous shells, many of them probably the Atrypa plena, which is so abundant in these same beds. (Fig. 6.)

To persons unfamiliar with such subjects, it is a striking fact that the buildings of our cities are constructed of the debris of the skeletons of marine animals, belonging to a bygone period of the earth's history, and that these same remains constitute sheets of limestone extending over many thousands of square miles, with a thickness of several hundred feet. As already stated, however, these

facts are very familiar to Geologists; yet they merit, especially with regard to the older formations, more attention in some res-

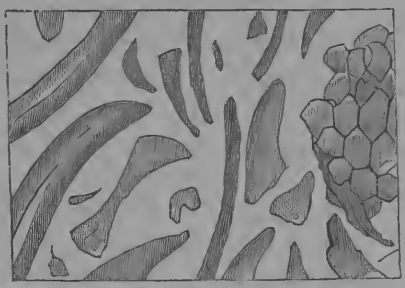


Fig. 6.—*Chazy Limestone, Island of Montreal,* (10 *diams.*)

pects than they have hitherto received. Microscopic examinations of organic limestones may serve to show the precise species which have most contributed to their accumulation, and the conditions under which their remains were spread abroad, and cemented into stone. They might also serve to identify limestones not containing entire organic remains, by showing the species out of whose fragments they had been formed. To do anything really valuable toward these objects, would require the patient preparation and examination of a great number of specimens; but, to any one who has leisure for the task, it might form a very interesting field of study.

ARTICLE XII.—*On Ozone.* By Charles Smallwood, M.D., LL.D., Professor of Meteorology in the University of McGill College, Montreal.

(Presented to the Natural History Society.)

The investigations on the nature and properties of Ozone, have within the few past years engaged the attention, and become the subject of enquiry, alike of the chemist, the meteorologist and the physician. The chemist has found its manifestations and properties approximate to, if not identical with Oxygen in a peculiar state of existence or development. The meteorologist (especially of the European continent) has proclaimed it to be the instrument, or medium, that Providence has secured to provide for the production of the grand phenomena of nature; that its action can explain the formation of all meteors, as well as the fluctuation and diurnal changes in the pressure of the atmosphere indicated by the oscillations of the Barometer, and that it is the true cause and

means of restoring to animals and to man a sufficient and normal amount of Oxygen, to replace that which may have become consumed by animal respiration, and the various operations of nature and of art. The physician, in his investigations on the cause of disease, and as guardian of the public health, more es pecially in reference to diseases of an epidemic character, has not been silent in ascribing to it a salutary or deleterious agency in proportion to its presence or absence, and as exerting an important influence on the health of individuals and of nations, varying with the time, the season, and the temperature.

A substance, the knowledge of which seems to be fraught with life and health, both to the animal and vegetable kingdom, and which must, as a consequence, have an important bearing on the agricultural and commercial wealth of nations, demands from the man of science, a calm and patient investigation, so as to give to it a proper place in the annals of *true* science.

It is for this purpose that the present observations are submitted, trusting that in so vast a field for enquiry, many may be found as co-labourers—willing to contribute, however little, to the vast treasury of true knowledge.

As far back as the end of the 18th century Van Marum, in experimenting on the electrical action on oxygen speaks of the odour or smell being very strong, and which appeared to him as the smell of electrical matter, and it is scarcely to be doubted that Gilbert, Hawksbee, Dufay, Franklin and others were equally sensible of the peculiar odour generated by electrical action.

It is about 19 years ago since Schonbein, during his investigations on the decomposition of water by the Voltaic pile, remarked the odour that became manifest, and in a letter written to Arago in 1840, he says, "that for some years past he had been familiar "with the odour generated during the decomposition of water by "this voltaic current," and to this simple elementary body he gave the name of Ozone (from ozo, to smell).

The first accounts of the investigations of this substance may be found in the "*Memoirs de la Société d'Histoire naturelle de Bâle*," in the "*Journal de chimie pratique*," Erdmann in the "*Annales de Poggendorf*," also in the "*Archives de l'Electricité*" de Marignac et De La Rive, and also in the various *British scientific periodicals.*

Schonbein at this period of his investigations believed it to be a simple elementary body analogous to chlorine, bromine and

iodine, but his opinion soon became modified, and he declared that nitrogen was not a single body, but consisted of hydrogen and Ozone, and it was supposed really to be a component of nitrogen; and his opinion was supported by Assam, who showed the identity of *atmospheric Ozone*, and Ozone produced by chemical action or decomposition: further investigation led to the opinion that it was a peroxyde of hydrogen.

Schonbein soon abandoned the opinion that Ozone was a component of nitrogen, and inclined to the opinion that it was a peroxyde of Hydrogen. Marignac and De la Rive demonstrated that Ozone could be formed without the presence of nitrogen. And Berzelius had already expressed an opinion that it was oxygen in a peculiar state.

At this period of its history, Fremy and Becquerel undertook a series of experiments illustrating the action of electricals upon oxygen, and proposed the name of *l'oxygene Electrise* which seems to have been at that time also adopted by Schonbein. Its presence in the atmosphere and its special production, has placed it beyond doubt as a substance possessing peculiar chemical properties, although several methods have been adopted to produce it artificially, such as the action of sulphuric acid on bichromate of potash, and also on the peroxide of lead, the most simple and easy method is by the use of Phosphorus. The process generally adopted is by taking a stick of phosphorus, cleanly scraped, about half an inch long, and putting it into a large bottle which contains just sufficient water to half cover the phosphorus, and then slightly closing the mouth, and letting it stand for some time at a temperature not less than 60°F. Ozone soon begins to be formed as is shown by the rising of the whitish fumes from the phosphorus which at the same time begins itself to be luminous. In a few hours the quantity will be considerable, and the bottle is then to be emptied of its contents, washed out and closed for use or experiment. The necessary conditions are that the air should be at the ordinary atmospheric pressure and at the temperature of about 60° F; humid and cold air retards and will scarcely give rise to its formation, and if the atmosphere be subject to an increased pressure, Ozone is not formed except by an increase of temperature: the presence of certain gases also prevents its formation.

It is also obtained by the decomposition of water by galvanism, and it may be formed in pure and dry oxygen gas by passing through it the electric spark. It may be said also to be formed generally when chemical combination takes place in contact

with the atmosphere, and the consequent reaction or disengagement of oxygen.

It is probable that oxygen may be modified more readily by electric action than any other gas, and it has been shown by Bequerel, Faraday and others, that it may be rendered magnetic.

Ozone is colourless, possessing a peculiar odor, resembling chlorine, and when diluted, cannot be distinguished from the *electrical smell.* Its density, according to Andrew & Tate, is said to be four times that of oxygen. It is a most powerful oxydizing agent, converting most of the metals into peroxides, it is very slightly absorbed by water after long contact,—a very high temperature destroys its properties,—it possesses bleaching properties, hence its affinity to chlorine; it combines with chlorine, bromine, and iodine. It is rapidly absorbed by albumen, fibrine, blood, &c. It is a most powerful disinfectant, and when largely diffused in atmospheric air causes difficult respiration, acting powerfully on the mucous membrane, and in still larger quantities may become fatal.

During the past year, Schonbein has been actively engaged on the modifications of oxygen, and is of opinion that there are two kinds of (allotropic) modifications of active oxygen, standing to each other in the relation of positive and negative, and that there are a positive active and negative active oxygen—an ozone and an ant-ozone which in being brought together neutralize each other.

Clausius has endeavoured to account for the relation of volume existing between simple and compound gases, by the assumption that in simple gases several atoms are combined to form one molecule of oxygen, that for instance one molecule of oxygen consists of two atoms of oxygen, and is of opinion that under special circumstances it may happen that among the number of molecules in a given quantity of oxygen some may be decomposed into separate atoms. These would differ in their relations towards other substances, from those combined into molecules, and he considers these uncombined atoms are Ozone.

Fortunately its presence, both in the state produced artificially in the laboratory, and also in the atmosphere, is easily detected. Its rapid production, its peculiar smell and other properties, render it somewhat less difficult to investigate than many other substances. We purpose more especially to consider its nature and influence in reference to Meteorology and its influence on animals and plants.

(*To be continued.*)

ARTICLE XIII.—*On the Relative Value of Human Life in Different Parts of Canada.* By Philip P. Carpenter, B.A.

(*For the Canadian Naturalist.*)

While the naturalists and geologists of the Royal Mount throw light on each other's studies in reference to extinct Palliobranchiates or recent Gasteropods, it may not be out of the province of this Journal to record facts in reference to living men and women; and those who would have been living had not the teachings of modern science been disregarded, or considered as of secondary importance to the pursuit of money or of power.

The exact connection between those sanitary conditions over which man has control, and the actual number of deaths in any town or district, is no longer a matter of hypothesis. The very accurate system of registration of births and deaths which has been carried out in England for more than 20 years, and of which classified returns are regularly published by the Registrar-general, has enabled chemists, physiologists, statisticians and other sanitary reformers to compare their theories with recorded facts, and to check off their reasonings, by the average of a long series of years. The following instance will shew the precision with which sanitary reformers can now predicate the rate of mortality according to the external circumstances of drainage, ventilation, &c. While Mr. P. H. Holland was registrar of the southern portion of Manchester (called Chorlton-upon-Medlock) he went through each district, tabulating each street, court, &c., in three columns, judging by his senses and knowledge what their rate of mortality was likely to be. In each street he also made a threefold division of the houses, according to their character. Here therefore were *nine* divisions, to each of which he assigned a *supposed* proportion of deaths to population. He then directed his clerk to tabulate the *actual* deaths in each of these divisions, taking the average of five years. On comparing the theory and the facts together, *in no case did they vary more than one-half per cent.* The following are the results, omitting the fractions:—

Deaths per 1,000 inhabitants in	Best houses.	Middling houses.	Worst houses.
Best streets.....	19	22	27
Middling streets.....	18	26	28
Worst streets.....	..	28	40

Thus the inhabitants of the best houses, in the best streets, live

more than twice as long as these in the worst houses of the worst streets.

The existing state of knowledge in England on these subjects, may be gained (1) from the quarterly and annual reports of the Registrar-general; (2) from the reports of Her Majesty's Commissioners on the Sanitary Condition of the working classes, and on the Health of Towns; (3) from local reports and tracts published by the various Health-of-Towns' Associations. The present laws of England will be found in the "Public Health Act," and especially in the "towns-improvement clauses." All these documents could be obtained, either gratuitously or at a very moderate expense, on application to "P. H. Holland, Esq., H. M. Commissioner for Burial Grounds, Burial Board, Whitehall, London, England." They would form a very important addition to the public libraries of every Canadian city.

It is not to be expected that in a newly settled country, where the population greatly fluctuates, according to the accidents of immigration or commercial prosperity, the same accuracy of detail can be arrived at. But, by collecting the facts already accessible, we can both take measures to guard against errors in future returns, and shew the necessity of immediate sanitary regulations.

For the year 1851, we are in possession of tables, very carefully drawn out, both of the population and of deaths, arranged according to different ages and conditions, in the various cities and districts of Upper and Lower Canada. By comparing these, one with another, and taking the average number of deaths for every thousand inhabitants during the year, we obtain the following results; the fractions here, as elsewhere, being disregarded.

For the purposes of comparison, statistics are added from England, where the returns are most accurately made, and the causes of error most carefully guarded against; and from the last official Registration Report of Massachusetts, as being a long settled State, in climatal conditions not very dissimilar to those of Canada. The general mortality of the principal part of Rhode Island is also added, from the Government Report.

Census of 1851.	Total population.	Total deaths.	Deaths per 1,000 inhabit's.	Percentage of total deaths.	
				Under 5 years.	From Xymotic disease.
All Canada	1,842,265	19,449	10½	43	25
Upper Canada	952,004	7,775	8	42	23
Do. less 5 large cities	880,737	6,754	7½	41	23
Toronto	30,775	474	15	52	19
Hamilton	14,112	172	12	47	42
Kingston	11,585	185	16	56	8
Ottawa	7,760	90	11½	48	29
London	7,035	100	14	49	24
Lower Canada	890,261	11,674	13	43	26
Do. less 2 large cities	790,494	8,632	11	39	28
Montreal	57,715	1,978	34	43	15
Quebec	42,052	1,064	25	69	37
English Rural Dis..1841	3,440,501	66,575	19	..	..
Forty large towns. "	3,759,186	96,999	26	..	..
Liverpool parish. 1840–2	.....	.....	35	54	..
Bristol city ..... "	.....	.....	26	42	..
" Rural Dis... "	.....	.....	19	33	..
" U. Clifton.. "	.....	.....	16	25	..
" L. Clifton.. "	.....	.....	34	51	..
Massachusetts 1853–1857	1,132,369	20,905	18	39	27
15 cities in do. above 10,000 inhabitants.	417,838	9,310	22	46	..
Whole State, less 15 cities.... "	714,531	11,595	16	34	..
Boston..... "	160,490	4,195	26	47	..
Charlstown ..... "	21,700	505	23	48	..
Fall River..... "	12,680	382	30	54	..
Springfield ..... "	13,788	265	12	47	..
Rhode Island State. 1853	118,722	1,126	9	..	28

Confining our attention at present to the third column, that of comparative mortality, we cannot but be surprised at the two following results: (1) the extreme healthiness of the country districts generally, and of the cities in Upper Canada; and (2) the extreme mortality of Montreal, notwithstanding the beauty of its streets and the substantial comfort of its mansions. It is natural to suppose that some peculiar disaster that year befel the city, from which the rest of the Province was exempt. Let us endeavour, therefore, to see how far the same ratio holds in other years.

In the Prothonotary's office are tabulated, year by year, the number of deaths and the increase of population by birth; Ottawa, Vaudreuil, Two Mountains, Terrebonne, Leinster, Berthier, Richelieu, St. Hyacinthe, Rouville, Verchères, Chambly, Huntingdon, Beauharnois, Missisquoi, Stanstead, and Shefford, containing a population of 428,588 souls, according to the census of 1851; partly rural, partly gathered into towns; subject to the same

climatal relations as Montreal, and inhabited by a people having the same religion and habits of life. The balance of wealth and the means of comfort are obviously in favour of the city. If Montreal has more than its share of sick persons, through the attraction of the hospitals, the same is true of Quebec and Toronto. Moreover, it is proverbial how long persons live in these establishments, owing to the kind and watchful nursing of the Sisters of Charity. And whatever increased mortality may be due to this cause, is probably more than counterbalanced by the number of consumptive patients who are sent out of the city into the country to die. The following are the returns, commencing with 1851, when first we have an accurate census of population. It will be remembered that 1852 was the year of the great fire, and 1854 of the cholera.

	MONTREAL CITY.				COUNTRY DISTRICTS.			
Years.	Total population.	Excess of births over deaths	Total deaths	Deaths per 1000	Total population.	Excess of births over deaths	Total deaths.	Deaths per 1000
1851	57715	+ 918	1978	34	428588	+11423	5853	14
1852	58633	+1053	1992	34	440011	+11093	6326	14
1853	59686	+ 763	2278	38	451104	+11280	6525	14
1854	60449	— 463	3739	62	462384	+ 8316	8731	19
1855	59986	+1028	2231	37	470700	+ 8586	7869	17
1856	61014	+1262	2284	37	479286	+ 9564	7184	15
1857	62276	+1438	2367	38	488850	+ 9447	7380	15
1858	63714	+1495	2299	36	498297	(+ 9447)*	(7521)*	15
Total	483473	+7494 or 16 per 1000	19168	40	3719220	+80156 or 22 per 1000	57389	15
do. less 1854	423024	+7957 or 19 per 1000	15429	36	3256836	71840 or 22 per 1000	48658	15

* The registration districts having been altered in 1858, these numbers are inserted hypothetically to complete the average.

It is not pretended that these tables are precisely correct. Absolute accuracy is of course unattainable in a country where there is no compulsory system of registration; the yearly returns of births and deaths being simply the records kept of religious ceremonies. In the country districts of Upper Canada, doubtless a large number of infants are born and corpses interred without any other record than in the family bible, if indeed in that. Still, each of the Upper Canadian cities, where deaths at least are recorded, shows so healthy a condition that the mortality of the country is probably not much greater than that recorded. But in Lower Canada, where the religious habits of the Catholic population almost compel resort to the font and to the cemetery, we may regard an average of 7 years as a fair criterion of its sanitary condition.

On examining the tables for the country districts, we find an extremely rapid rate of increase, being no less than 22 per thou-

sand each year. This speaks well, not only for the morality and industry of the inhabitants, but also for the resources of the country. The mortality, however, appears slightly on the increase, and presents an average considerably above the mortality of the whole province in 1851. This average is not essentially disturbed by the cholera year. It is probable that the extra mortality of the rural districts of Lower above Upper Canada, is due not so much to the severity of the climate (which in Ottawa city closely resembles that of a large part of the Montreal District) as to the close stoving and intensely dry and heated rooms; a habit which would doubtless carry off a much larger number of victims, were it not for the extreme purity of the surrounding atmosphere.

The point, however of most *vital* importance, for it affects the lives of thousands, and the health of myriads, is the *excessive mortality of Montreal.* Not only did it present in 1851 a ratio of death greater than that of any city in Canada or New England; amounting to 8 per 1,000 over Boston, with its immense and crowded Irish population; 9 per 1,000 over Quebec, with its bleak climate, narrow streets and rock-bound courts; 20 per 1,000 over the five cities of the West, and the same over the country district, six times as populous, in the midst of which it raises its beautiful domes and spires; not only so, but its *mortality has been increasing;* and on the average of 7 years, even leaving out the terrible 1854, it presents a catalogue of deaths greater than that of Liverpool (the most unhealthy and over-crowded of English cities), in its most unhealthy epoch, before the days of sanitary reform; when 39,460 of its inhabitants lived in 7,892 *cellars;* when 55,534 fought against death in 1,982 courts, containing 10,692 houses, built back to back, one third of them *closed at both ends*, and at best provided with only a surface drainage, which might be called a fever-bed condensed.*

* At that time the cellars were generally from 10 to 13 feet square, sometimes less than 6 feet high; often with only bare earth for a floor; frequently with no window, and the ceiling on a level with the street. Generally there was no other drainage than a cess-pool under a board, which had to be ladled out; sometimes a cess-pool of putrid matter was allowed to incubate its fevers under a sleeping bed. Sometimes a back cellar was used as a sleeping room, with no light or air but what could enter through the front. Each house above contained two or more families, among which one woman complained that they were "rather crowded, since the people in the next corner took lodgers." The population was huddled together to an extent *nearly three times the maximum*

But it is not fair to leave out the cholera year from the average. The same poisonous gases which yearly raise the mortality from 14 to 34 or even 38 per 1,000, occasionally concentrate their energies for the development of a cholera, a ship-fever or some other pestilence. Such visitations are often looked upon as "special providences;" but they are as natural and necessary results of culpable neglect in sanitary matters, as is delirium tremens of continued intoxication, or ship scurvy of unwholesome diet. The people of Montreal must continue to lodge such visitants so long as they make homes for them in putrid emanations; and they would be deprived of what is justly their own if these pestilences were excluded, as much as if the key were turned in their market of Bonsecours or in the parish church of Notre Dame. The fire did not add to the mortality of the city; it consumed the fever-beds as well as the dwellings, and drove the people into the shelter of the fresh air. But the cholera found a congenial atmosphere in the swamps of Griffintown; it not only devoured the yearly increase of the city, but killed off 463 persons *over and above* as many as were born that year; so that for *each thousand of the* 60,000 inhabitants of the city, sixty-two human beings perished. The grave that year hastily swallowed up 3,739 living souls. The worst recorded pestilence in England during the present generation was the Famine-Fever year of 1848, in Warrington. In that year one out of every 20 inhabitants died; in the Montreal Cholera of 1854, *out of every fifteen citizens one was found dead!* A widow said of the first visitation of the dreaded Asiatic pestilence in Bristol, that it was a "blessed cholera;" and she spoke truly, for it was the cause of the Sanitary Reform movement, which has saved its myriads of lives and will save its millions more. The fever in Warrington led to the immediate cleansing of its filth; and its inhabitants are now yearly taxing themselves large sums for investment in the underground life insurance. The people of Montreal have to this day retained their unenviable distinction as the dwellers in the city of wealth and death; and even last year their Council not only refused to lay the dust of the city, but could not draw water enough from the mighty river to allow the inhabitants to do it at their own expense!

---

density of London, and consisted in great measure of the dirtiest and poorest of the Irish race. Such was Liverpool in 1841; and *more unhealthy even than this* has been Montreal from 1853 to the present time; although for five months in every year its laboratories of pestilence lie harmless in the safe prisons of the ice and snow!

Montreal was not the only city which was scourged by cholera. Vaudreuil and Lachine, in its immediate vicinity, shared the plague; but with how different results the following table will show.

Analysis of 3 years, 1853–1855.		Total population.	Excess of births over deaths.	Total deaths.	Deaths per 1000.
1853	Lachine..	20376	+355	349	17
	Montreal..	59686	+763	2278	38
	Vaudreuil.	22647	+609	394	17
1854	Lachine..	20731	+ 53	614	29
	Montreal..	60449	—463	3739	62
	Vaudreuil.	23256	+404	556	24
1855	Lachine..	20786	+328	402	19
	Montreal..	59986	+1028	2231	37
	Vaudreuil.	23660	+192	257	11
Total for 3 years.					
1853–1855	Lachine..	61893	+736 or 12 per 1000	1365	22
	Montreal..	180121	+1228 or 7 per 1000	8248	46
	Vaudreuil.	69563	+1205 or 17 per 1000	1107	16

Several causes may be assigned for the frightful amount of mortality which the stern facts of the burial registers assign to the city of Montreal. The first of these is emigration. The emigrants are said to be a peculiarly unhealthy race of people, landed on the shore only in time to die. If that were the cause, we ought to find the mortality of Quebec greater than Montreal, as the poorest and most sickly are unable to proceed further; whereas Quebec only loses 25 to 34 who perish at Montreal. Moreover, the earlier years, when the emigrants were most numerous, were far more healthy than the later ones, when emigration has considerably slackened, and when those who arrive are much better cared for. The principal way in which the emigrants affect the returns is by increasing the population. This will probably lessen the average of later years; to what extent the coming census only can decide. It is the custom in each city to state loosely the supposed number of its inhabitants; I have not been able, however, to find any accurate returns beyond those given above. The tide of emigration affected Toronto fully as much as Montreal; yet its mortality is *considerably less than half* that of its older sister. As an offset to the increase of population, it may be necessary to say, that, in each year but one, several of the religious bodies sent in no returns (on the average, 6 each year). It is presumed, however, that the number of deaths thus unregistered is but small.

Again, it will naturally be supposed that the free use of liquor in Montreal is a principal cause of its extreme mortality; the Catholic rural population being peculiarly sober in their habits. How great is the effect of drinking on health, the two following classes of facts will testify. The first is from an analysis of the books of eleven Sick Clubs in the town of Preston, Lancashire, of which 8 were open to all, and three were restricted to teetotalers. They are each corrected to a scale of 1,000 members.

Average of Preston Benefit Societies.	Number of members sick.	Average time of sickness.	Total weeks sick.	Cost to the Club.
Temperance clubs,	139	3 wks. 2 ds.	458	$1013
General clubs,	233	7 " 4 "	1770	$4012

The second is extracted from the "Journal de Société de la Morale Chrétienne" for Aug. 1847. The testimony is very accurately ascertained, and gives a comparison of *strong country labourers* where liquor was distributed, with *sickly inhabitants of towns* where the drink money was expended on better food. Both parties were employed on government work. In the country districts of Holstein, Mecklembourg, Oldenbourg, and Hanôvre, *where drink was given*, out of 20,952 labourers employed, 472 became sick, or one out of every 44. Whereas out of 7107 labourers from the towns of Brunswick, Oldenbourg, and the Hanseboroughs, *to whom drink was not supplied*, there were only 70 sick, or one out of every 90.

But the deaths in towns do not so much result directly from drinking, as is shown by comparing Montreal with Toronto and Ottawa, where drinking was just as much followed, and yet the mortality continued low. The usual effect of liquor is to weaken the constitution of its votaries, and thus render them an easy prey to the various forms of town disease, which abstainers are frequently able to avoid or at least to throw off.

The early exposure of infants by Catholic parents, for baptismal purposes, has also been assigned as a cause for the extreme mortality of Montreal. But this cause will affect, to an equal or even greater extent, the adjacent or rural districts; whereas, out of every 100 deaths in Montreal, 43 are of children under 5 years of age; in the country only 37: while in the Protestant cities of Upper Canada, the mortality is much greater, varying from 47 to 56. In England the fourth column of the original table furnishes a very exact guide to the amount of preventible mortality. In Canada there appear anomalies which would perhaps be explained

by an average of many years. Such is the enormous infantile mortality of Quebec, amounting to 69 out of every 100 in 1851.

The same may be said with respect to the last column, which represents the percentage of deaths arising from "xymotic" or *air-poison* diseases, which, though generated even in country places, are peculiarly destructive in towns, where they are not instantly diluted with fresh air. In England, out of every million persons living in the country, 3,422 die every year of these diseases; while of the same number living in towns, 6013, or *nearly double the number*, die from the same causes. The returns for Canada, however, will have to be corrected by an average of years; for we find healthy Hamilton losing half of its total number from these diseases, while Montreal loses only 15, and Kingston, with less than half its mortality, only 8. The town-smells, therefore, have other ways of killing-off those who inhale them than by infectious complaints, and this they do, in general, by the gradual weakening of the constitution, through which the system is unable to bear up against whatever disease happens to attack the sufferer.

It appears, therefore, by comparing the averages of Montreal and its adjacent districts, even leaving out the fever year, that there are 21 deaths in every thousand persons which might yearly be prevented; that is, on the present population of (say) 65,000 inhabitants, *the people of Montreal kill-off thirteen hundred and sixty-five of their own flesh and blood* every year, who would not die did they only pay as much attention to health in the city as they do in the country; to say nothing of hundreds of lives more which country and towns' people alike sacrifice on the altar of self-indulgence and "*laissez-faire.*"

But this is not all. From the returns of the Manchester Dispensaries, it appears that to every case of death there are 28 cases of sickness. These, on the average of the Preston Sick Clubs, last 5 weeks each. Therefore the people of Montreal voluntarily tax their health to the extent of 38,220 cases of sickness *every year*, which is equal to a loss of 191,100 weeks, or 2,674 years; that amount requiring to be taken twice over, once for the suffering invalid and again for the anxious nurse.

Nor is this the whole of the evil. There is a large amount of general enfeeblement of health, which does not develope into actual disease. This brings misery on the daily life, urges to the use of poisonous stimulants, often leads to recklessness of conduct, destroys the desire and even the power of amendment, and works corruption throughout the whole fabric of society.

To the work of palliating or curing diseases, 25 physicians or other medical men honourably devote their lives, and are thankfully supported by the inhabitants, along with 15 vendors of drugs; in all, an apparatus of 40 persons devoting their energies to restoration, besides large numbers of Hospital attendants, Sisters of Charity, and other nurses employed in tending the sick. But to this day the city of Montreal does not employ a single officer of health to detect the *causes* of preventable disease, nor does she make it a requirement in the men she elects to her Municipal Council, that they should enforce those sanitary regulations which the law empowers them to carry out.

The limits and scope of this paper do not allow me to point out the special causes of this extreme mortality, nor the means required for their removal. It may be sufficient to place on record an account of a court in the Petite Rue St. Antoine, which I visited in April last in company with a Domestic Missionary. It was by no means so bad as many parts of the Griffintown suburbs. It is to be hoped that the time will soon come when this description will be as great an antiquarian curiosity as the "plague-stone" in the Warrington Museum, in a hollow of which the money was passed through vinegar to prevent transmission of infection.

We left the street through a covered passage, treading on bricks and pieces of wood through a mass of wet and decomposing manure and filth. Reaching thus the small back-yard, we found it to consist apparently of a widely-extended midden, consisting of disgusting slutch and every kind of refuse, from a few inches to some feet in thickness. On two sides, this yard was separated from two similar ones by partition fences; on the other two it was enclosed by dwellings. The inner house, or rather hovel, was divided into two; the two little rooms upstairs, inhabited by a French family at a rent of $4 a month; those below by two families, paying $3.50 for the liberty of being poisoned. The miserable rooms not only got no air but what was charged with the stenches of the yard, but just outside were several privies, too disgustingly filthy to be used, but breeding "nast" to soak through the wooden walls and door of the inner room. This was filled by a family, where of course there was sickness; with closed door and window, so that no air entered but what was saturated with fever-stenches. For the upper rooms of the cottage opposite, $8 a month were paid. On descending the stairs to reach the street, we had to cross over fluid matter, stepping on bricks. The lower story, for which $6

are generally paid, was now necessarily empty, being flooded, I will not say with water, but with liquid manure, the disgusting emanations from which ascend through the stair case and between the boards, into the upper story. It was by wading on bricks through this mass of pollution that the tenant had to obtain her supply of water; this being the one only health-spot in the whole, where the pipe, rising through the fœtid drainage of the court, discharges the pure water of the Ottawa for the pallid occupants. The upper tenants had been there for 15 months, and assured me that the yard had never been cleaned during the whole time. And yet the authorities, who confiscate unwholesome meat when offered in the shambles, allow the use of these unwholesome dens to be freely sold to those whose ignorance or poverty keeps them from remonstrance; and men are found willing to draw $21.50 a month, as payment for the privilege of inhaling poison, in places where no right-thinking man would keep his horse, scarcely his pig; and where he would not live himself (or rather die) for any amount of money.

During the long months of winter, all injurious emanations are happily frozen up, like the fabled tunes blown into Munchausen's horn. But when the spring thaw comes, the whole mass of corruption, which has been accumulating on the surface and among the snow, is set free; not only sinking into the unpaved back yards, and there laying by a deep store of pollution to rise up at the bidding of the summer sun, in the form of fever or cholera; but running into and around the dwellings, soaking into the floors, and sponged up by the timber walls, where the reeking colour, premonitory of disease, is hidden behind some tawdry paper; and the heedless victim of ignorance, generally also of intemperance, hires the poisoned coffin in which his wife and little ones are constrained to dwell.

In the more healthy parts of the city, the winter manure is dislodged by the melting snow and precipitated on the solid matter. As the streets rapidly dry, fine dust is formed in immense masses; and while the poor below are wading on bricks through the liquid stench-bowls,* the gentry are inhaling similar pollutions in the form of impalpable and perceptible dust. It is evident that both

* The myriads of flies of which the inhabitants complain, are the necessary result of the putrid refuse. In the present state of the city, they act as nature's scavangers, and should be reckoned among the greatest blessings.

streets and yards should be cleared as soon as ever the substance is soft enough to be removed; that the liquid manure, instead of running to waste in the river, should be employed to fertilize the land; that all back yards not used for cultivation, should be paved with brick or stone; that houses should be drained with some other material than wooden troughs; that the plan of fixing frame houses on wooden legs over swamps should be expressly prevented; and that a complete system of sewerage should be provided for the poorer, far more than even for the wealthier portions of the community.

The mere fact of sewering and cleansing 20 streets in Manchester, inhabited by 3,500 persons, reduced the mortality from 31 to 25 per 1,000; that is, prevented 21 deaths and 588 cases of sickness in 7 months. In Windmill Court, London, there were 41 cases of sickness in 7 months. The landlord paved and sewered it, and supplied it with water; and in the same space of time afterwards, there were only 2 cases. He did it at his own expense, and "made a good thing of it."—When the Manchester Council swept their streets by machine every day, they found that the roads scarcely ever needed repair. In Aberdeen and Perth, the expense of the similar daily cleansing was more than covered by the sale of the manure.

What is poison to man is food to the plant. One pound of urine contains all the elements necessary for one pound of wheat. The fœcal matter of two adults is sufficient manure to raise an acre of corn or pease; or that of one man will produce an acre of turnips, if the green matter is returned to the soil. The value of manure in Flanders is $9·25 per man. Land near Edinburgh, which used to let for only $15 per acre, now fetches from $100 to $200 per annum, simply from being irrigated with town refuse. And in the town of Rugby, the system of drainage is so complete that whatever is deposited in the dwelling in the morning, by noon is spread over the fields in a minute state of division, before decomposition has time to develope its poisonous stench.

As the cost of sanitary measures is generally the greatest obstacle to their adoption, it may be well to inquire whether their neglect is not still more costly. The following is an attempt to exhibit the—

ANNUAL PECUNIARY LOSS TO THE CITY OF MONTREAL, RESULTING FROM "LAISSEZ FAIRE."

Value of manure, now run to waste or breeding sickness, on 65,000 inhabitants, besides animals, say at $3,	$195,000
Loss from 191,100 weeks of preventible sickness, at $3 per week,	573,300
Cost of 1,365 funerals at $15 each,	20,475
Supposed pecuniary value of 1,365 lives; estimating a Free Canadian simply as property, at Elihu Burritt's tariff of $300 per head,	409,500
Maintenance of orphans, &c., say	1,725
Total,	$1,200,000

To which ought to be added an indefinite amount for injury to stocks of goods, dress, furniture, &c., resulting from dirt and dust.

These and similar facts prove that, however expensive sanitary reform may be, the present system is far more so; and that however difficult it may be to cleanse the Augean stables in the back yards of Montreal, it is the duty of the Council to see that the wages of death are no longer wrung from the hard earnings of the poor, but that all who undertake to let houses shall be compelled to put them and their surroundings into a condition favourable to health and life.

If a Statistical Society were formed to collect and verify information on this and other social subjects, it might be able to lay important facts before the governing bodies; and might point out the causes of error in the present returns, with a view to their correction in the forthcoming census. The English "Health of Towns Associations" have also been extremely useful, (1) in making reports of the actual condition of their respective localities, by visiting from house to house; (2) in diffusing information among the masses of the people by free lectures and plainly written tracts; and (3) in watching and acting upon city officials and owners of property, in a way which private individuals hesitate to do.

When Edwin Chadwick, Esq., the first mover of sanitary reform in England, visited the Exhibition of Industry in Paris, every opportunity was offered to the deputation from the Society of Arts, of which he was a member, to see the notabilia of that magnificent capital. The Emperor afterwards asked him what were his impressions of the city. He replied by giving Louis Napoleon a half-hour's disquisition on the sanitary condition of Paris, and the necessary steps to be taken for its immediate improvement. The courtiers were filled with indignation; His Majesty answered by

a smile.—In the same way I have endeavoured to show my grateful appreciation of the kindness of the Canadian people, by applying the knowledge gained in the old country to the altered conditions of the new, and shall be rejoiced indeed if what has been written, strongly, it may be, but calmly and advisedly, should be received, neither with indignation nor with smiles, but with a determination to amend the laws of disease and death, by which the inhabitants of Montreal have thus far been governed. Let the Queen City of the North, that sits enthroned on the Royal Mount, with for her footstool the River of Freedom, her breast adorned with princely mansions, her jewels of colleges and cathedrals her boast of commerce and of wealth, be clothed with the white robe of Health, pure as her winter's snows, and crowned with the diadem of Life, bright as her summer's sun, so that her future may fulfil the prediction of the Prophet,—

"My people shall not labour in vain,
"Nor bring forth children for early death.
"No longer shall there be an infant of days,
"Nor an old man that hath not fulfilled his time:
"For he that dieth at a hundred years shall die a youth,
"And the sinner dying at a hundred years shall be held accursed.
"They shall not build, and another inhabit;
"They shall not plant, and another eat:
"For as the days of a tree shall be the days of my people;
"Yea, long shall they enjoy the works of their hands."

Is. lxv. 20–23.

Boston, May 13, 1859.

ARTICLE XIV.—*On a specimen of Aboriginal Pottery in the Museum of the Natural History Society of Montreal.*

(Read before the Natural History Society.)

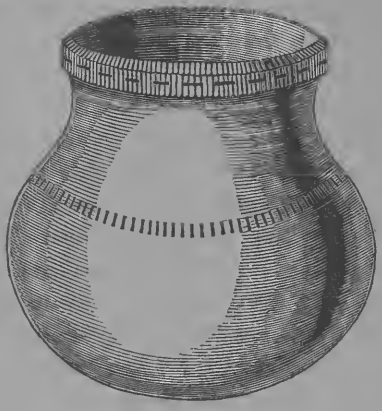
Among other treasures of this Society recently exposed to view by the re-arrangement of the collection in the new building of the Society, is a remarkably perfect earthen vessel of Indian workmanship, presented by Mr. H. T. Goslin of Clarendon, Pontiac county, through the Lord Bishop of Montreal; and which, but for the confusion incident to the removal of the Museum, would have been noticed in this journal some time since. It was found, along with another of similar form and dimensions, under a flat stone, in a rudely walled space prepared for the vessels, which were placed mouth to mouth, and contained only a

small quantity of brownish powder. No other aboriginal remains were found with them, nor anything to indicate the probable purpose of their interment. The precise circumstances in which they were found were thus communicated by Mr. Goslin to the Society.

"The urn was found on lot No. 4 in the 8th range of lots in this township (Clarendon). A number of years since, when Mr. Seaman, the owner of the farm, was clearing the land, his attention was attracted by a singular wall or mound of stone. He saw a part of the urns (which were placed vertically), and at first supposed it was a stone carved in that form, and paid no further attention to it till July, 1856, when he went to it, and removing a part of the wall, found the urns. They were placed vertically, the mouths being joined, and the lower one filled with earthy matter, a part of which is sent with the urn. Having heard of the affair, I visited the spot, and hoping to make further discoveries, obtained help, and with levers removed the large stone which was over the urns. We found beneath it a wall regularly laid, though not cemented, enclosing a space 8 feet by 6. The wall was about 5 feet high; 3 feet below and 2 feet above the surface, and open at a part of the west side. As the stone which covered it had been broken by some means, probably by the action of fire, I could not ascertain its exact dimensions. That part which I measured was of an irregular figure, about 6 feet 8 in. in length, 4 or 4½ feet in breadth, and from 1½ to 3 feet in thickness. Evidence of the antiquity of the structure is afforded by the fact that since it was built a maple tree had grown to the size of about 20 inches in diameter, decayed, and fallen; its roots, together with those of several smaller trees and shrubs, having extended over the wall. The soil on that part of the wall at the west side was about 10 inches deep."

The form of the urn is represented in the accompanying wood cut. The material is a fine reddish felspathic clay with many grains of quartz and films of mica; the whole being apparently the product of the decomposition of granite, and, independently of the coarse particles intermixed, an excellent material for terra cotta. The form is as regular as if moulded by the potter's wheel, and is not deficient in symmetry. The general surface is smooth, with very fine revolving lines, produced by the instrument used to give form and finish to the exterior. The thickness at the mouth is $\frac{3}{10}$ths of an inch: the circum-

ference of the mouth outside 24 inches, that of the narrowest part of the neck 23 inches, that of the widest part of the swell



35 inches. The depth within is 11 inches, or very nearly equal to the greatest transvere diameter. The edge or lip of the mouth is slightly bevelled outward and neatly marked with radiating sharp furrows. A band or fillet similarly marked, and $\frac{3}{4}$ of an inch in depth surrounds the mouth, and its sameness is agreeably broken by an interrupted horizontal furrow running round the middle of the fillet. A less distinct row of vertical furrows runs round the upper part of the swell. All these ornamental markings are very carefully and cleanly cut, and the whole aspect of the vessel bespeaks taste and skill in the workman, and indeed, compares favourably in these respects with some Roman cinerary urns, that stand on the same shelf, or with the ordinary pottery of our own time.

The brown powder found in the vessel, appears to be the remains of some coarse farinaceous substance, probably Indian meal, or pounded parched corn.

In its form and ornament this vessel is of the same type with the Indian pottery of all parts of North America; as for example with that found on the sites of Indian villages in the state of New York, and in the western mounds, and still in use among the Mandans and other nations of the west. Anterior to European colonization, the Indian tribes appear pretty generally to have made coarse pottery, without the aid of the potter's wheel, but the art disappeared rapidly from most of the tribes, on the introduction of metallic vessels. "Upon the site of every Indian town," says Squier,* "as also within every ancient enclosure,

* Aboriginal Monuments of New York (Smithsonian Contributions).

fragments of pottery occur in great abundance. It is rarely, however, that any entire vessels are recovered. Those which have been found, are for the most part gourd-shaped, with round bottoms and having little protuberances near the rim, or often a deep groove by which they could be suspended. A few cases have been known in which this form was modified and the bottoms made sufficiently flat to retain the vessel in an upright position, fragments found in Jefferson County, seem to indicate that occasionally the vessels were moulded in forms nearly square, but with rounded angles.* The usual size was from one to four quarts; but some must have contained not less than twelve to fourteen quarts. In general there was no attempt at ornament; but sometimes the exterior of the pots and vases were elaborately if not tastefully ornamented with dots and lines, which seem to have been formed in a very rude manner with a pointed stick or sharpened bone. Bones which appear to have been adapted for this purpose are often found. After the commencement of European intercourse, kettles and vessels of iron, copper, brass, and tin, quickly superseded the productions of the primitive potter, whose art at once fell into disuse." These vessels were not only used for culinary and domestic purposes, but were sometimes buried with the dead, containing probably articles of food for their use in the spirit world; and, as Charlevoix mentions offerings of *sagamatie* or pounded parched corn to the dead, this may have been the substance contained in the Clarendon vases, which may have been buried, either as an offering of this kind, or as a store of provision for the living. It may appear adverse to the former supposition, that vessels placed with the dead were usually rendered unserviceable, a fact observed in Canada and Oregon, and of which the writer once met with an instance in Nova Scotia. In other instances, however, uninjured vessels are known to have been deposited in this way.†

The modern manufacture of pottery among the Mandans is thus described by Catlin. "I spoke also of the earthen dishes or bowls in which these viands were served out; they are a familiar part of the culinary furniture of every Mandan lodge, and are manufactured by the women of this tribe in great quantities, and

* There is a vase with a square mouth, in the collection of the Natural History Society.

† Lapham, Antiquities of Wisconsin (Smithsonian Contributions), p. 29.

modelled into a thousand forms and tastes. They are made by the hands of the women from a tough black clay, and baked in kilns which are made for the purpose, and are nearly equal in hardness to our own manufacture of pottery; though they have not yet got the art of glazing, which would be to them a most valuable secret. They make them so strong and serviceable, however, that they hang them over the fire as we do our own pots, and boil their meat in them with perfect success. I have seen some few specimens of such manufacture, which have been dug up in Indian mounds and tombs in the northern and middle states, placed in our eastern museums, and looked upon as a great wonder; when here this novelty is at once done away with, and the whole mystery, where women can be seen handling and using them by hundreds, and they can be seen every day in the summer also, moulding them into many fanciful forms, and passing them through the kiln where they are hardened." * Catlin does not mention the shape of these vessels; but they appear incidentally in several of his plates, and would seem to be often of the form of that referred to in these notes, though sometimes in that of flat bowls.

The interesting points in connection with this and other examples of Indian pottery, are, the general prevalence of the art even among the rudest tribes, its rapid disappearance on the introduction by commerce of better vessels, the similarity in form of these vases to those of most ancient nations and to the general forms of modern pottery, the accuracy of contour bestowed on them without the potter's wheel, and the selection of a material which has in all countries approved itself as the best suited for the purposes of the potter. These points are, I think, of sufficient ethnological interest to entitle this donation to a short notice in the proceedings of the Society.

J. W. D.

ARTICLE XV.—*On the Indian Tribes of McKenzie River District and the Arctic Coast;* from a Correspondent.

(Presented to the Natural History Society.)

This sketch of the language and manners of Chipewyan tribes, may be divided into three heads: 1st. the Geographical Distribution; 2nd. the various Branches of which the tribes are composed; and 3rd. an account of other tribes of different origin to be found in the McKenzie River District.

---

* American Indians, vol. 1, p. 116, and plate 46.

The Chipewyans may be considered the purest stock, and call themselves Tonish or Dimish, (the People.) They are scattered over a large and important portion of North America, either themselves or their off-shoots. They are to be found in greater or lesser numbers from about 95° west longitude, to the Rocky Mountains, and from about 55° of lat. to the Arctic circle. By this statement I do not mean to say that they inhabit so extensive a tract of country, but merely that they are to be met with between these extremes. The most eastern of the H.B. posts to which they resort for purposes of trade is Churchill on Hudson's Bay, which they reach by descending the English River. I do not suppose they winter any where in the vicinity of the Great coast line, nor that they have much intercourse with the Esquimaux, what intercourse does exist however, is of a friendly character. On the south they are not met with below Isle-à-la-Crosse. About Lesser Slave Lake, and at St. Johns on the Upper waters of Peace River, Crees are the present inhabitants. The Lesser Slave Lake country, from its source evidently belonged at some former period to the Chipewyans, as the usual name given to numbers of this tribe is slaves, but they not being by any means so warlike as their opponents, have been in all probability beaten back by the superior arms and energy of the Cree nation. I have heard that one of the plain tribes the Cirsees was a Chipewyan off-shoot, and resemblance of language and general reports render this very propable. To the westward, the Chipewyan is found along Peace River, in the Beaver tribe, at Fort au Levid in the Slave tribe, and along the McKenzie in Slave and Stare tribes as far north as the Arctic circle, and the Bloody Fall on the Coppermine River.

The Chipewyan nation is bounded by the Crees to the southward, this latter people have penetrated though in small numbers to Athabasca Lake, and hunt in common with the Chipewyans the country along the Athabasca and English Rivers, and that lying between Peace River and Lesser Slave Lake. Although enemies formerly, they are now on intimate and friendly terms. To the eastward the intercourse of the Chipewyan with the Esquimaux is but trifling. A wide and barren tract of country intervenes between their hunting grounds and the coast, while the best means of water communication, the Great Fish River, is very dangerous. The Stare Indians indeed meet with the Esquimaux in an amicable manner on the Anderson river, a stream lately dis-

covered and surveyed by Mr. Roderick Ross McFarlane, lying to the eastward of Fort George Hope, and flowing into Liverpool Bay. To the northward and westward they fall in with the Loucheux, or Kutching, and are on the best understanding with them, although these people speak an entirely different tongue, are distinguishable in features, and distinct in their superstitions and habits of life. On the western side an intermixture takes place with the Nahannies, Siccanees, Manocies, Monde and other tribes of different names, but most likely all of cognate race with the Chipewyans themselves.

The known branches into which the Chipewyan race has divided itself are as follows: 1st. the Chipewyans of English River, Athabasca and Great Slave Lake; 2nd. the Beaver Indians of Peace River; 3rd. the Caribou Eaters and Yellow Knives of Athabasca and Great Slave Lake; 4th. the Dog Ribs of Great Slave Lake and Martin Lake; 5th. the Slaves of Great Slave Lake and the McKenzie and Levid Rivers; 6th. the Hare Indians of McKenzie River and Bear's Lake, all of which will be passed separately and briefly in review.

1st. The Chipewyans inhabit the south east portion of the territory already mentioned, and are the most numerous family of their race. The name Chipewyan or Chipawyan is apparently one given by the Crees, meaning (Chipaw), pointed and (wyan) shirts. If this be actually its derivation, it would appear that the Chipewyan tribes wore shirts or tunics of the same shape as the Loucheux dress at some former period. This shape is now never seen among them. The name among themselves is the rather grandiloquent one of Dimish, or The People. They are in general of middle-size and well proportioned, the face flat with high cheek bones, giving a pear-like appearance to the head. Their hair is strong and coarse, but they have neither beard nor whiskers; the hands and feet are small and well made. For an aboriginal people their character is not bad, for although selfish and grasping to the utmost degree, they are honest and far from blood-thirsty. They are all confirmed liars, and they treat their women more as slaves than companions. Morality among them is at a low ebb. Polygamy though not common exists, and, although very jealous of their wives, chastity in unmarried females is scarcely considered a virtue among them. A Roman Catholic Mission has been for several years established among this tribe, which doubtless has had some effect, in preserving the outward decencies of mo-

rality among its converts. Their Christianity is very impure, as they have mixed up many of their superstitions with the ceremonies of that Church. Fancy their sending letters to God, when any one dies, using the coffin as the post office !

2nd. The Beaver Indians, whose dialect is farther removed from the Chipewyans than that of any of the other branches, reside in the country along both sides of Peace River, as far as the upper waters of Hay River on one hand, and Lesser Slave Lake on the other, from just below Fort Vermilion to the Rocky Mountains. They are a bolder and braver race than the others, honest and hospitable, indeed superior in most points to the Chipewyans, whom they much resemble in features, customs, and moral character, as well as in the treatment of the softer sex. They live as Nomades, possess houses, and subsist principally on the products of the chase. They are good workers in iron, and fabricate very neatly formed spears and crooked knives from worn out files.

3rd. To the northward and eastward of the Fond du Lac of Athabasca, as far as to the north end of Great Slave Lake, Lake Aylmer, and the east side of *Yellow Knife* (Copper Mine) River, dwell the Caribou Eaters or Yellow Knives, who are the same tribe under two designations. They are a large and stout race of men, fairer and better featured than the Chipewyans, especially the women, who are much prettier. This may arise from the superior quantity and quality of their nutriment. Their language is almost pure Chipewyan ; they bear the worst character of any of the cognate race. Their notions of morality, honesty and veracity are very lax. Their location is in the low woods bordering on the barren grounds, at which latter they meet every summer for the Reindeer hunt, this animal being their great support. On its flesh they subsist, its skin affords them clothing, its sinews thread, and the raw hide when cut up into small lines like cat-gut, is used by them sometimes as a substitute for twine in the formation of nets. Though formerly at war with the Esquimaux residing at the outlet of Back's River, there is now no hostile intercourse between them, and the Yellow Knives seldom proceed further coastwise than the Head waters of the before mentioned river.

4th. Adjoining the Yellow Knives are the Dog Ribs, (Kloy Dimish), whose lands extend from Yellow Knife River to the southeast side of the Bear Lake, and to about midway between Martin Lake and the McKenzie River. In the latter part they

are much intermingled with the Slaves, from whom they can scarcely be distinguished, except by being of large stature, and possessing a thick stuttering and disagreeable manner of enunciation. They are comparatively very numerous, living principally like the Yellow Knives upon the Reindeer which abound in their country, and like that tribe clad much in skin dresses. Like all the Slave tribes in contradistinction to the Beaver Indians, Chipewyans, and Yellow Knives forming the Chipewyan division, these people are kind in their treatment of their women and dogs, and have the custom universal in all their race of dropping their original name upon the birth of a child. They are then only styled the father of so and so. But the Kloy Dimish go farther still, they change their name after the birth of *every* child, and an unmarried man is called the father of his favorite dog if he have one.

5th. The Slave Indians inhabit the tract between the west end of Great Slave Lake to below Fort Norman, extending up the Liards on one side and to Bear Lake on the other. At Fort aux Liards there is in this tribe a great mixture of Beaver race, to the westward of the McKenzie of the Siccanee and Nohanney. They are a well disposed and peaceable race, their life is a hard one; they subsist on hares, fish and deer, and often have great difficulty in obtaining the means of living Notwithstanding this, a Slave would sooner starve than eat a piece of a dog or mink, indeed he will not skin the latter animal when captured in his traps, although its pelt is a valuable article of barter. They manufacture twine for nets out of the bark of a species of Willow, and dishes that hold water out of its plaited roots, more durable than from Birch bark.

6th. The Hare Indians reside in the country around Fort Good Hope on the McKenzie to beyond the arctic circle where they come in contact with the Loucheux, Quarrelers, or Kootchin, with whom by intermarriage they have formed the tribe of Loucheux Bâtards. They are a stout thickset race, subsisting partly on fish partly on Reindeer. There is little difference in the language from that of the Slaves, and their dress and customs are the same. With the Esquimaux of the newly discoverd Anderson River, they are on good terms. This tribe is not numerous, having perished in large numbers from starvation in 1841, when many sad scenes occurred. From long intercourse with the whites, for whom they have great respect and affection, most of the superstitions and customs of these tribes are extinct. Their idea either of the formation of the world or the deluge is that a muskrat dived

to the bottom of what was then all water, and brought up some earth which was moulded into consistency by the Beaver. The Loucheux entertain the same tradition in a slightly modified form. Chipewyans have ideas of a good and evil principle, but their ador tion if it may be so called is paid to the latter, and consists of rude gesticulations, singing, and conjurations for the benefit of the sick, and called Nitch or Medicine. Their places of interment are rude cages or câches of logs placed on the surface of the ground, in which the body is deposited, wrapped in a blanket or moose skin, while the relatives destroy their property and cut their hair in sign of mourning. Their songs are unmusical and generally accompanied by drumming on a kind of tambourine, forming the usual Orchestra for their dances. The latter consist of ungainly leapings in a circle, commonly around the small fire used to light their pipes, and in them women are permitted to join. Moose-nose and hearts of animals, as well as the heads, are not allowed to be eaten by women or dogs, from a superstition that if such occurred the hunters would lose their skill. Among the Slaves of the valley of McKenzie, rabbits are the principal food. When these fail suddenly as they generally do, the natives fancy that they mount by the trees into heaven, and when they reappear, that they return by the same path. The moral character as well as the worldly condition of these tribes has been much improved by the mild and impartial sway of the Hudson's Bay Company. Polygamy as well as incest, is now of very rare occurrence. Intestine wars and murders are unknown, while infanticide, formerly so prevalent, has become almost a tradition. One point of their customs which I have overlooked, may here be mentioned. Their manner of personal combat is to catch each other by their long hair, and twist about until one falls down. Although this is in general a most harmless way of settling a dispute, instances have occurred of dislocation of the neck in the affray. Quarrels arise commonly about women, and the fair one becomes the prize of the conqueror.

A Protestant Mission of the church of England pursuasion is about to be established by the Church Missionary Society at Fort Simpson on the McKenzie River, for the Slave communities, which will doubtless improve in a high degree the religious notions and moral character of this interesting and inoffensive people.

The other tribes inhabiting the McKenzie River district are 1st the Siccanees; 2nd. the Nahannies or Mountain Indians; 3rd. the Loucheux or Kutchin; 4th. the Esquimaux.

1st. The Siccanees are a tolerably numerous tribe. In this district they resort to Forts Liards and Selkirk for purposes of trade and inhabit the country between the Liards and the head waters of Peace River among the Rocky Mountains entering into New Caledonia. If they speak Chipewyan, their dialect is a very corrupt one. In disposition they resemble the Beaver Indians, and they are generally of good stature.

2nd. The Nahannies live to the northward of the Siccanees, about the head waters of the Liards Rivers, Francis Lake and the Pelly River and westward across the mountains to the Pacific In appearance they resemble the Slaves.

3rd. The Loucheux are an exceedingly numerous and powerful people, if the various tribes of them inhabiting Russian America be taken into consideration. They occupy the northern waters of the McKenzie from below Fort Good Hope and Point Separation, where they meet the Esquimaux, as well as Peels River. They are found across the Rocky Mountains on the Rat River, on the Youcan or Kutchpark, and on the lower Pelly, in fact they people the greater part of the interior of Russian America.

In appearance they are bolder featured than the Slaves, as well as of larger stature. Their disposition is blood-thirsty, and independant, resembling a good deal that of the plain tribes. In the treatment of women they are harsh, and *female* infanticide is is not uncommon among them. Polygamy is prevalent as well as divorce for trifling misunderstandings. The Peels River Loucheux put their dead on scaffolds, those of the westward burn them, and much property is destroyed upon the death of a chief. A strong belief in the powers of Medicine men is universal among the Youcan tribes, no Indian dies by natural death, but he is killed by the conjuration of another at some distance, and this superstition is the cause of much bloodshed among them. The Peels River branch is at war with the Esquimaux. They were formerly a very numerous people, but war and disease have sadly reduced them. Several treaties have been patched up between these hostile nations by the Hudson's Bay Company, but only to be broken, and the avenging of fresh murders keeps up an unbroken line of deadly fueds. Having had a trading intercourse for several years with the Company's Post at Peels River, these people have become milder and much more tractable than their unsophisticated brethren on the Youcan.

The dress of the Loucheux or Kutchins is a peculiar one, it

consists of a tunic or shirt of leather coming to a point in the skirt both behind and before, ornamented with quills, fringes and beads. The trousers and shoes are of one piece, and are also garnished. Men and women are clad in like fashion in trousers.

4th. The Esquimaux as far as we know of them are very numerous. At the points with which we are acquainted, their coast line extends inland to below Point Separation on the McKenzie, the Bloody Fall on the Copper-mine River, and the confluence of the Great fish with the McInlay Rivers. They are a more powerful, braver and energetic race than the Indians. Their complexion in truth is fair, and some of their women are reported as absolutely beautiful.

ARTICLE VI.—*On the Natural History of the Gulf of St. Lawrence, and the distribution of the Mollusca of Eastern Canada.* By Robert Bell, jr.

Having been employed by Sir W. E. Logan to assist Mr. Richardson in his geological explorations in the Gulf of St. Lawrence during the summer of 1858, and at the same time to collect as many specimens as possible, to illustrate the natural history of that part of the Province,* the following lists, prepared by his directions, contain a brief summary of my observations, together with numerous facts regarding the distribution of the Mollusca in other parts of the country.

The district explored is that part of the Province below Quebec which is bounded on the north-west by the St. Lawrence, east by the Gulf, and south-east by the Bay of Chaleurs and Ristigouche River, and is chiefly comprised in the counties of Rimouski, Gaspé, and Bonaventure. By referring to a map of the Province the localities mentioned in this article will be readily found, the greater number of them being situated on the south-east side of the St. Lawrence, between Quebec and Gaspé. In these lists I give the names of all the localities at which each species was found when not generally diffused, from which some inferences may be drawn in regard to their geographical distribution; and I must here acknowledge my indebtedness to Mr. D'Urban of the

* During the summer of 1857, I accompanied the same party on an expedition to the Gulf, and some observations which I then made on the natural history of the country through which we passed are published in the Report of Progress for that year.

Geological Survey, who most kindly furnished me with a list of the Birds, and drew up the accompanying Catalogues of Coleoptera, Lepidoptera, and Plants.

VERTEBRATA.

MAMMALIA.

Vespertilio subulatus (Say's Bat).—Numerous in the vallies of the Ristigouche and Matapedia Rivers. I killed one of them with my fishing rod, which in its eagerness to take the bait from my hook, did not cease to fly after it, till it met with its death.

Sorex Forsteri (Forster's Shrew Mouse).—Procured two specimens; said by the Indians to be very abundant.

Ursus Americanus (The Black Bear).—Not uncommon; there are two varieties in the district, one all black, and the other, which is said to be more ferocious, black with a white spot on the breast. The fur of the Gaspé bears is of a highly superior quality.

Mustela martes (The Pine Martin).—The Indians bring home from their winter hunts, more of the skins of these animals than of any other.

M. vison (The Mink).—Ranks next to the marten in its importance to the Indian hunter.

M. vulgaris (The Common Weasel).—Abundant.

M. Canadensis (The Fisher).—Does not seem to be very abundant, but the Indians always bring to market a few of their skins when they return from their hunts.

Mephitis Americana (The Skunk).—Not uncommon, and sometimes killed by hunters for its skin, which is used for making sleigh robes.

Lutra Canadensis (The Canada Otter).—Very abundant along every stream. One of our Indians told me that he once secured three otters of large size, with one shot. He said, that after watching for them some time, they all came up together through a hole in the ice, when he aimed at the middle one and killed it on the spot, only a few grains of shot striking the other two, who immediately set on one another, as though mutually supposing each other to be the cause of their pain, and during the combat he dispatched them both with his tomahawk.

Canis lupus (The Common Wolf).—I was informed by the Indians that the wolf does not come farther north than the St. John River, where they are sometimes seen in small packs, and destroy the young moose.

C. fulvus (The American Fox).—Three varieties of the fox, the black, silver-grey and yellow, exist thoughout the district.

Lynx Canadensis (The Loup-cervier or Canada Lynx)—Abundant, and much sought after by the hunters.

Phoca —? (Seal).—A seal generally of a mottled grey colour, ascends the St. Lawrence beyond Cacouna. Farther down the river, we sometimes saw, during summer, quite a number of them swimming together.

Castor fiber (The Beaver).—Formerly when the fur of the beaver brought such a high price, they were very much hunted in this part of the country, but since it has fallen to less than quarter of what it was, the Indians do not kill them, except when an opportunity of shooting one accidentally falls in their way, and they consequently now re-occupy, often in great numbers, the places which they had long deserted.

Fiber zibethicus (The Musk-Rat.)—This animal, so abundant in all other parts of Canada, is likewise so, in the lakes and quiet streams of our present district.

Mus musculus (The Common Mouse)—Infests barns in the summer time.

Pteromys volucella (The Common Flying-Squirrel).—Rare.

Sciurus (*Tamias*) *Lysteri* (The Chip-munk).—Rare also.

S. Hudsonius (The Red Squirrel).—Abundant throughout the whole district.

Hystrix pilosus (*dorsata*) (The Canada Porcupine)—Appears to be much more abundant in the north-eastern part of the district (Gaspé) than in the counties of Rimouski, or Bonaventure. They become light grey or almost white when very old, but are said to be the same colour all the year round.

Lepus Americanus (The American Hare).—Notwithstanding its numerous enemies, is probably the most abundant quadruped in the woods.

Cervus alces (The Moose Deer or Elk).—For the last few years most of the hunters have devoted their time to killing the moose simply for the sake of their skins, which now command a higher price than formerly, and this they do at any season of the year which suits their own convenience. We were informed, that a party of these hunters had procured 300 skins the previous winter, and that another party of only three Indians had killed during the same season between 90 and 100 on one expedition, as many as six sometimes falling a prey to them in one day, yet still these noble animals roam in vast numbers over the district.

C. tarandus (The Caribou).—Very numerous about the Shick Shock Mountains. Some of our party, who were on the extensive flat top of Mount Albert, one of this range, reported that there, an area of great extent was strewn with vast quantities of fragments of their horns, most of which gave evidence of great antiquity.

AVES.

Haliætus leucocephalus, Linn. (Bald Eagle).—Immature individuals frequently seen from Green Island to Martin River, in June and July, and an adult on the Ristigonche, August 31st. At St. Anne, on June 17th, I saw one of this species flying off with a long string of seaweed entangled in its claws, and on the 30th at the same locality I observed a large eagle, which I took to be this species, and which, after hovering about for some time, dashed into the water at the mouth of the river, with such velocity that it entirely disappeared beneath the surface for some seconds, rising again with a fish of considerable size, apparently of the species commonly called the Sea Toad (*Cottus Grœnlandicus*) and flew off with it towards the mountains inland. I picked up wing-feathers of this species on several occasions on the shore, and at Green Island and Marcouin River I was shown wings of specimens which had been shot at those places.

Astur fuscus, Gmel. (Sharp-shinned Hawk).—Two specimens observed at Capuchin, about the clearings, in August.

Surnia funerea, Gmel. (Hawk Owl).—When at Green Island I was shown the head and wings of a specimen which was shot there about the middle of October.

Syrnium nebulosum, Gmel. (Barred Owl).—Occurred on the Marcouin River.

Chordeiles Virginianus, Briss. (Night jar, Mosquito Hawk).—Observed at Chatte River June 18th, Ste. Anne, June 28th to July 17th, and at the mouth of the Matapedia August 28th. At Ste. Anne July 17th, I was shown the eggs of this species deposited on the bare ground without any attempt at a nest. The parent bird was sitting on them, and although very frequently disturbed for some days, and her eggs much handled, one having been even cracked, she made no attempt to remove them, as this bird is said to do on similar occasions, and she invariably returned to the nest as soon as we left the spot, propably because the eggs were nearly hatched. She appeared incommoded by the day-light, and permitted us to approach very closely before she took to flight.

Hirundo bicolor, Vieill. (White-bellied Swallow).—Very abundant at Cape Chatte and Ste. Anne, June 28th and 30th, and at Martin River July 20th. This species breeds in holes in decayed trees standing on clearings, in vast numbers at the above localities.

Hirundo fulva, Vieill. (Cliff Swallow).—Numerous at Metis, at the beginning of June.

Hirundo rustica, Linn. (Barn Swallow).—Abundant at Trois Pistoles, where they were building their nests under the eaves of a store, May 30th, also observed at Metis, June 10th, and near Long Point, June 15th.

Hirundo riparia, Linn. (Sand Martin).—A few observed making holes in a sand cliff on the banks of the river at Ste. Anne, June 28th.

Sylvicola coronata, Lath. (Yellow-crowned Warbler.)—One shot at Green Island Village, May 25th.

Troglodytes hyemalis, Vieill. (Winter Wren).—Observed on the Patapedia River, September 5th.

Parus atricapillus, Linn. (Black-cap Tit).—First seen on the Patapedia, September 5th, afterwards frequently observed in various localities.

Regulus satrapa, Lich. (American Golden-crest).—Several specimens were obtained at Rivière du Loup, May 18th.

Turdus migratorius, Linn. (Robin).—Numerous at Rivière du Loup, Cacouna, Metis, Matanne, Long Point, Chatte River, Ste. Anne, Marcouin and Matapedia rivers. At Marcouin river, July 24th, I observed numerous young birds feeding on the maggots and grubs in rotten fish.

Anthus Ludovicianus, Lich. (American Pipit).—Abundant, running about on low flats near the sea shore at Rivière du Loup, May 10th and 20th, Cacouna May 22d, Green Island Village, May 25th, and Rimouski June 5th. The colour of this bird so exactly resembles the tint of the low, wet ground, stained yellowish with iron, and covered with withered herbage, where it resorts in immense numbers, that although hundreds were running around me, I could distinguish none till they rose in the air.

Alauda alpestris, Linn. (Shore Lark).—In large flocks on the stubble in the wheat-fields at the beginning of October, about Rimouski.

Plectrophanes nivalis, Linn. (Snow Bunting).—Large flocks at Kamarouska at the beginning of November. Mr. Richardson

captured a specimen alive, which had been injured by flying against the Telegraph Wire.

Emberiza socialis, Wils. (Chipping Bunting).—Common at Rivière du Loup, Rimouski, Long Point, and Chatte River.

Niphœa hyemalis, Linn. (Common Snow Bird).—Abundant from Rivière du Loup to Martin River, and at Little Lake Matapedia. I saw young birds full grown at Ste. Anne, July 15th, and found a nest containing 4 eggs, July 17th.

Carduelis tristis, Linn. (Yellow-bird or Goldfinch).—Common at St. Fabien and along the coast to Martin River.

Fringilla Pennsylvanica, Lath. (White-throated Sparrow).—Very numerous everywhere about the clearings along the coast. I found a nest containing four eggs near Long Point, June 16th. It was on the ground and composed of dry grass. The eggs were bluish with some dull red spots at the larger end.

Erythrospiza purpurea, Gmel. (Purple Finch).—One specimen observed at St. Fabien, May 30th, and flocks were seen at Ste. Anne, July 18th.

Agelaius phœniceus, Linn. (Red-winged Starling, "Blackbird").—Two seen at Ste. Anne, July 17th.

Quiscalus ferruqineus, Lath. (Rusty Grakle).—Numerous flocks seen in the clearings along Metis River, and between Metis and Rimouski, in September and October.

Corvus Americanus, Aud. (Common American Crow.)—Abundant all along the coast, feeding on *Littorina*, and digging up *Mya arenaria* at low tide. They frequently carry the latter a considerable distance from the water, and at Cacouna the empty valves were lying in great numbers on the cliffs in the vicinity of their nests. At Trois Pistoles I found an old nest nearly filled with the shells of *Succinea obliqua*, each having a hole picked in it. On one occasion having wounded a Crow, I tied him to t e root of a tree, and his outcries soon attracted an immense number of his fellows, several of which I shot. Near Green Island Village I saw a flock chasing a Fox round a field. At Cacouna, May 21st, I found two nests on Spruce trees, one contained 5 eggs nearly hatched, and as is usual with the eggs of l e *C rvinæ*, they differed much in colour and markings. The other nest contained four unfledged young, two being much larger than the others. It was also an abundant bird on the Ristigouche in August.

Garrulus cristatus, Linn. (Blue Jay).—One seen at Little Lake Matapedia, August 19th.

Garrulus Canadensis, Linn. (Canada Jay, "Moosebird").—Very common all over the district in the Forest, often approaching within a yard or two of us, when at our meals, in its well known familiar manner. The Indians consider this bird one of their greatest annoyances, as it steals the bait from their traps, and devours their moose-meat when hanging up to smoke. One of our Indians told me, that the preceding winter, while in the act of skinning a deer one of these birds commenced feeding on the flesh, and he split its skull with his knife.

Bombycilla Carolinensis, Briss. (Cedar Bird).—Common at Metis, Ste. Anne, and at the mouth of the Marcouin river.

Sitta Canadensis, Linn. (Red-bellied Nuthatch). — Several observed August 19th, at Little Lake Matapedia, and one picked up dead near the foot of Big Lake Matapedia.

Trochilus colubris, Linn. (Humming-bird).—One seen at Metis about the middle of August.

Alcedo alcyon, Linn. (Belted King-fisher). — Abundant on every river and lake throughout the district, from May 19th to the end of September. A hole about three or four feet from the top of a sand cliff near the mouth of the River Ste. Anne, in which a pair of Kingfishers had their eggs, I found to be upwards of six feet in depth.

Picus pileatus, Linn. (Pileated Woodpecker, "Log-cock").—I was given a specimen which was killed near Green Island. The Indians report it to be rare in this district.

Picus villosus, Linn. (Hairy Woodpecker).—I shot a specimen at Ste. Anne, June 28th, and another I noticed on the 30th June at the same place, had its nest in a White Birch tree about 35 feet from the ground, and the young were distinctly heard. This Woodpecker was also observed between St. Fabien and Bic, Marcouin and Martin Rivers.

Ectopistes migratoria, Linn. (Passenger Pigeon).—Not very numerous, but a few seen at Chatte River, Ste. Anne, Matanne and Metis. It was rather numerous in August between Metis and Matepedia Lakes, and on the Ristigouche.

Tetrao umbellus, Linn. (Ruffed Grouse, "Partridge").—Near Rimouski, but rather scarce.

Tetrao Canadensis, Linn. (Canada Grouse, "Spruce Partridge"). On the 25th June, I was shown one which was caught in a trap near Matanne. I observed several on the Marcouin River at the end of July, and on the 30th July we met an old Grouse with her

brood about half grown, which flew at us as we passed, exactly as a common hen would have done. A few occurred near the Matepedia Lakes, but it was by no means as plentiful as on the Magdalen River last summer.

Strepsilas interpres, Linn. (Turnstone).—Observed at Green Island October 26th.

Tringa pusilla, Wils. (Little Sandpiper).—Abundant at Rivière du Loup and Green Island in May, and at Chatte and Martin Rivers in July.

Tringa, ——— ?—A Sandpiper which Mr. D'Urban has been unable to identify, was shot at the mouth of the Marsoni river, August 4th.

Totanus solitarius, Wils. (Solitary Sandpiper).—One specimen shot August 31st, on the Ristigouche where it was abundant.

Totanus vociferus, Wils. (Tell-tale Tatler).—Many pairs seen at Rivière du Loup, May 20th.

Scolopax Noveboracensis, Gmil. (Red-breasted Snipe).—One specimen obtained out of a large flock near Green Island, May 25th.

Ardea Nycticorax, Linn. (Night Heron, "Swamp Hen").—Abundant in the swamps near Dalhousie, N.B., also observed on the Patapedia and near Lake Metis.

Anser Canadensis, Linn. (Common Wild Goose).—Abundant at Rimouski at the beginning of June, near Chatte River June 17th, and in vast flocks near Green Island and Cacouna at the end of October.

Anser leucopsis, Bechst. (Barnacle Goose, "Berneche" of the Canadians).—Great numbers were passing down the coast when I was at Rimouski on 1st October, and I saw many that were shot by the numerous gunners stationed on the quay over which the Geese passed in their course, and they were also numerous at the end of the month at Green Island.

Fuligula Fusca, Linn. (Velvet Duck).—Numerous flocks observed along the coast from June 17th. Dead specimens were picked up on the sea shore near Ste. Anne in July.

Fuligula perspicillata, Linn. (Surf Duck).—I was given the stuffed head of a specimen killed at Green Island, I also noticed it in a collection of Bird skins, made by Pierre Fortin, Esq., J. P., commanding the Government Schooner "La Canadienne," on the coast of Labrador.

Fuligula clangula, Linn. (Golden-eyed Duck).—Numerous

near Bic and Green Island in October. One killed on Metis Lake September 18th.

Fuligula histrionica, Linn. (Harlequin Duck).—One killed at Ste. Anne, several on the Ristigouche, August 26th, and on the Patapedia, September 7th.

Mergus serrator, Linn. (Red-breasted Merganser).—First met with at Ste. Anne, June 30th. Common on every river and lake, as well as on the coast, throughout the district, several young birds were killed on the Matapedia August 21st.

Phalacrocorax carbo, Linn. (Cormorant, "Mouniac" of the Canadians).—Very abundant between Bic and Green Island, middle of October.

Larus atricilla, Linn. (Black-headed Gull).— In great abundance along the whole coast. Several other species of Gull were observed, but no specimens were obtained.

Mormon Arcticus, Linn. (Puffin).—In Capt. Fortin's collection from the coast of Labrador.

Alca Torda, Linn. (Razor Bill).—With the last species.

Uria Troile, Linn. (Common Guillemot).—With the two last species.

Uria Grylle, Linn. (Black Guillemot).—Very abundant at Hare Island at the beginning of May, at Green Island at the end of that month, and at Ste. Anne, and near Martin River in July. At the last named locality a fisherman informed me, that they generally lay three eggs, but that he has found five in one nest. On our return to Green Island, October 26th, it was still numerous there.

Colymbus glacialis, Linn. ("Loon").—Observed at Rimouski, Marcouin River, and on Lake Metis.

Colymbus septentrionalis, Linn. (Red-throated Diver).—Anticosti, Mr. Richardson, 1856.

REPTILIA.

Reptiles appear to be very scarce in this district, and the three following species so widely distributed over Canada were the most frequently met with:

Tropidonotus sirtalis, Linn. (Striped or Garter Snake).

Rana pipiens, Gmel. (Leopard Frog).

Salamandra, (*Plethodon*) *erythronota*, Green, (Red-backed Salamander.)

PISCES.

For the scientific names of several of the fishes mentioned in the following list, I am indebted to Principal Dawson, of McGill College, who kindly favoured me with a list of those which I had preserved in spirits; but of many common species I did not preserve specimens, and mention them here merely to note some fact connected with their history in our waters.

Gasterosteus biaculeatus, (Three-spined Stickleback).—In the greatest abundance in small streams, ponds, ditches, &c., near the shore. I also found a specimen among some trout, caught in a net in Lake Matapedia, which magnificent sheet of water is about 500 feet above the sea.

*G. pungitius?** (Ten-spined Stickleback).—Same habitat as the preceding species.

Cottus Grœnlandicus, (Sea Toad).—Very numerous in shallow water at fishing stations, where it seems to feed on the offal thrown into the water.

C. ————, (Fresh-water Bullhead).—Ristigouche River and Metis Lakes.

Scomber vernalis, (The Mackarel).—Is said to ascend the river no farther than Rimouski; but is not abundant for a considerable distance farther down.

Salmo salar, (The Salmon).—Ascends all the Rivers in the peninsula which are not shut up by mill-dams. The Ristigouche River and its tributaries are considered the best of all for salmon fishing, and the Ste. Anne of those on the south-east side of the St. Lawrence.

S. fontinalis, (Common Brook Trout).—Very abundant in every stream and lake, often at a great height above the sea, and in apparently inaccessible places.

S. trutta, (The Sea Trout).—The same fish as that referred to on page 97 of this volume, is abundant for a short distance up all the streams in Gaspé, and is also caught in gill nets set at right angles to the shore near the mouths of the rivers.

Osmerus viridescens, (The Smelt).—Caught in the fisheries along with sardines. They are also taken very readily with the hook and line.

Alosa præstabilis, (Common Shad)—Taken in brush fisheries, and cured in considerable numbers.

---

* (?) *G. Dekayi*, Ag.

A. tyrannus, (Alewife).—One specimen procured at Rimouski.

Clupea virescens? (Sardine).—These little fish are taken in great quantities in the fall of the year in brush fisheries along the shores of the St. Lawrence as far up as the salt water extends.

C. elongata (Common, Herring).—The herring fishery is not much attended to on the south-east side of the St. Lawrence, although the fish are very abundant. In spring they are largely taken at some places in brush fisheries, and sold fresh for a few pence per bushel; often for nothing else but to manure land.

Mallotus villosus, (The Capelin).—Prodigiously abundant along the whole coast during the fore part of summer, and are taken in immeuse quantities in brush fisheries, and with scoop nets for manuring land and for bait for cod. There is one of these brush fisheries at almost every second house, each of which takes enough, not only to supply the owner with an abundance of manure, but also some of the farmers in the back concessions, who depend upon him for their supply. It is a wonder that any of the unfortunate capelin escape at all, considering the vast number of these set to intercept their progress. I was informed, on good authority, that 40 cart loads (8 bushels each) were frequently taken out of one of these enclosures. Every family along the coast has a number of scoop nets, made by placing a fine meshed net between the prongs of a forked stick, with which they dip great quantities of capelin out of every shoal they see passing by their part of the beach. On the 11th of June, I saw 15 men engaged at this work, in one place, where a great shoal was kept close against the shore by the waves. They were standing in the water dipping them ashore, while a number of carts were busily engaged in drawing them off, the women and children assisting to load them. There were at least 200 bushels lying on the beach at the moment we visited the spot, and they said that they had been engaged at the same work nearly the whole day. One of these men told me that this was nothing to what was sometimes done, and added that he had seen 3000 bushels taken in a day by the inhabitants of one place.

Ammodytes Americana, (Sand Launce).—Abundant, and used for bait for mackarel, in the stomachs of which they are frequently found.

Morrhua Americana, (Cod).—I was informed that the extreme height to which the cod ascend the St. Lawrence was Apple Island, not far from Trois Pistoles, and that some seasons they did

not go so far. They are plentiful as far up as Rimouski, and are caught abundantly, of large size, at Metis, where a considerable fishing is done about five miles from land. To these upper limits they follow the capelin in spring, but remain after they have disappeared.

M. æglefinus, (The Haddock).—Taken with cod at all the fishing stations, and a few are sold mixed up with them; but when sold separately they bring a much lower price.

M. pruinosa, (The Tomcod).—Plentiful in the mouths of rivers from the county of Rimouski upwards. This is the same fish which is taken in such great abundance at Three Rivers during the winter.

Motella cimbria? (The Four-bearded Rockling).—One specimen from Ste. Anne. This appears to be the first time the occurrence of this species has been noted on this coast.

Zoarcus viviparus, (The Viviparus Blenny).—A Blenny which cannot be distinguished from this species, was caught in the dredge in deep water off Marcouin, which is, I believe, the first time it has been found in the Gulf.

Hippoglossus vulgaris, (The Halibut).—These large fish ascend the St Lawrence as far as Green Island, and are caught in considerable numbers at all the fishing stations. I was informed that they were sometimes caught between six and seven feet in length; but I never saw one quite so large, although they generally attain a considerable size.

Spinax acanthias, (Spinous Dog-fish).—At Les Islets I saw a spinous shark, which, I have no doubt, from my notes, was this species. It was a very large specimen, and was brought ashore by some men, who caught it when fishing for cod.

Raia radiata (Starry Ray).—Occasionally caught with codfish at Ste. Anne. A hunter here cures the flesh of the starry ray, with which he baits his traps in winter, and says that it is preferable to any other for some animals.

Salmo.—A fish of this genus, called by the Indians "Toag,' and by the French Canadians "Touradi," exists in great numbers in all the larger lakes, but are said never to be found in any of the rivers. In the Metis Lakes they are said to be of the same average size as the salmon, and are taken in winter by dropping a line through a hole cut in the ice. A settler at Lake Metapedia told us that he could spear enough of them in two nights to last his family all winter. They are of a much darker colour than

the salmon trout. The head is large, and the body tapers regularly to the tail. The flesh is of a yellow colour, and for the table is equal to the salmon. In the Metis Lakes there are, besides "Toag" and a large red variety of *S. fontinalis*, called "Rag," at least two other species of the genus Salmo.

Coregonus.—A species of herring trout, probably *C. clupeiformis*, abounds in the deep clear water of the Metis Lakes. Our Indians informed me that in the fall immense shoals of them approach the shores of the lakes, and that hundreds of barrels might be taken with a seine.

Cyprinus.—A species of chub, with very large scales, was abundant in Lake Metapedia and elsewhere.

Catastomus.—Black suckers were abundant in the Restigouche River and the larger lakes, but as I did not preserve specimens I could not be certain of the species.

Anguilla.—Eels, probably *A. acutirostris*, are abundant about the mouths of all the rivers, and toward the upper limits of the salt water are barrelled in considerable quantities for the market. A thick short black eel is extremely abundant in the Metis Lakes and River. The remains of a contrivance for catching these fish, which was long ago built by the Indians almost across a narrow part of the lower Lake, are still in existence.

Platessa.—Flounders, or as the French Canadian fishermen called them *Plaise*, were taken in great abundance with cod lines at Ste. Anne and other places, and used for manuring land. Small flatfish are also taken among shoals of capelin.

INVERTEBRATA.

CRUSTACEA.

Hyas fissirostra?—A spider crab agreeing with Say's description of *Lissa fissirostra* and DeKay's *Hyas coarctata*, (but not however with Bell's description under the same name,) in fishing grounds of moderate depth, and especially at Ste. Anne, and were devoured in great numbers by almost all kinds of fish. In the stomachs of halibut some very large specimens were procured, but the largest of all were caught by fishermen with cod hooks. The carapace of one of these measures 4 inches from the anterior to the posterior extremity. This is quite a different crab from the large *Maia*, parts of which Principal Dawson obtained in Gaspé Bay.

Cancer irroratus.—This is probably the most abundant crab in the Gulf. The breadth of the carapace of the largest specimen in the collection is $4\frac{1}{2}$ inches.

Pagurus Bernhardus.—Abundant in shells of Natica, Buccinum, Fusus, &c.

Homarus Americanus.—Lobsters are rare on the south-east side of the St. Lawrence, but very abundant on Anticosti and in the Bay of Chaleur as far up as Dalhousie, and Principal Dawson mentions them as being likewise abundant in Gaspé Bay.

Astacus Bartonii.—The common crawfish is abundant in the Matapedia, Restigouche and Metis Rivers, and in 1857 I found a specimen just below the high falls of the Ouiatchouan, which empties into the south side of Lake St. John.

Crangon vulgaris.—Although the common shrimp is abundant in the St. Lawrence, and largely devoured by the cod, the fishermen have not yet got into the way of using them for bait.

C. sculptus.—A specimen corresponding nearly with Bell's description of this, was caught in the dredge, off Cape Chatte.

Hippolyte (?).—A shrimp of this genus was dredged near Metis; but the specimen is so much damaged, that the species is not satisfactorily determined.

Orchestia (?).—A species of beach-flea swarms in all the pools left by the receding tide.

MOLLUSCA.

Gasteropoda (Marine).

Fusus scalariformis.—Peter River, Ste. Anne and Marcouin, in stomachs of haddock and flounders, and living specimens dredged in 60 fathoms at the latter place.

F. Islandicus.—Trent, Ste. Anne and Marcouin, not common.

F. tornatus (Gould).—Parts of large individuals were found on the shore at Rimouski, and complete specimens near Ste. Anne. This is the same species as the one so common in the Post Pliocene clays near Montreal.

F. decemcostatus.—Two good specimens in a collection of shells brought from near Cape Gaspé by Sir W. E. Logan in 1844.

F. rufus.—Numerous specimens from stomachs of fish at Ruisseau Vallée.

F. Bamffius.—Same source.

Pleurotoma bicarinata ?—One specimen from same source.

Buccinum undatum.—Whole coast from Rivière du Loup downwards; very abundant at low tide, and constitutes one of the principal articles of bait used by the fishermen after the capelin have disappeared.

B. Donovani.—Dead specimens were found at different parts below St. Flavie.

Nassa trivittata.—Plentiful in Bay Chaleur as far up as Dalhousie, but was not observed on the north coast of Gaspé, although it was found by Principal Dawson in Gaspé Bay.

N. obsoleta.—A number of specimens in Sir W. E. Logan's collection from the gulf.

Purpura lapillus.—Whole coast below Little Metis; extremely abundant and used as bait for cod.

Trichotropis borealis.—Dead specimens obtained at Ste. Anne and near Cape Chatte.

Velutina haliotoides (*lævigata*).—Ste. Anne, in stomachs of flounders, rare; living specimens dredged in deep water off Marsoni.

Lamellaria perspicua.—Ruisseau Vallée, one specimen amongst fish offal.

Natica heros.—Large and abundant in the sandy coves along the Gaspé coast. Great numbers of them of small size were found on the beach near Dalhousie, N.B.

N. clausa.—Collected on the shore at Bic and St. Luce, and found plentifully in stomachs of fish at Capuchin, Ste. Anne, Ruisseau Vallée and Marcouin.

N. triseriata.—I found this species in Magdalen Bay in 1857, but never in any other place.

N. flava ?—Rimouski, Les Islets and Glande.

N. helicoides.—Marcouin, in stomachs of haddock.

Rostellaria occidentalis.—Incomplete specimens common at Bic. A young specimen was procured at Glande, and a perfect one at Ste. Anne.

Rissoa minuta.—Green Island and Long Point, abundant.

Lacuna vincta.—Very abundant from Rimouski downwards.

Littorina palliata.—Whole coast from Rivière Ouelle downwards. At Dalhousie they are of a beautiful clear yellow colour.

L. rudis including *tenebrosa* which may be only a variety.—Whole coast.

Margarita cinerea.—Obtained in considerable numbers from stomachs of flounders and haddock at Ste. Anne, and a few from the same source at Marcouin, Ruisseau Vallée and Peter River.

M. undulata.—In fishes stomachs at Ste. Anne and Ruisseau Vallée, but not so plentiful as

M. helicina.—Trent, Les Islets and Ste. Anne, abundant.

*Skenea costulata.**—A specimen of this beautiful little species was found by Principal Dawson in examining some of the material which was dredged in deep water off Marcouin.

Diadora noachina.—Plentiful in stomachs of haddock taken at Capuchin, Ste. Anne and Marcouin, also dredged in considernumbers at the latter place.

Crepidula fornicata.—One specimen found at Dalhousie, N.B., very abundant at Carraquette.

C. plana.—Carraquette.

Acmæa (Lottia) testudinalis.—Dead specimens common at Rivière du Loup, but first found alive near Trois Pistoles; very abundant along the whole coast and in Bay Chaleur. At Les Islets where the water inside of the islets becomes by the heat of the sun percetibly warmer than that outside, these shells exist in immense numbers and attain the diameter of 1 inch and 7 lines.

A. cæca.—Numerous dead specimens dredged at Marcouin.

Chiton marmoreus.—One large specimen found at Bic; numerous on stones and dead shells dredged off Ste. Anne and Marcouin. and found in fishes' stomachs at coves on the Gaspé coast.

(Fresh Water.)

Planorbis trivolvis.—L'Orignal on the Ottawa, Lachine, Montreal, and in the Rimouski, Metis and Ristigouche Rivers; found also, in 1857, in Lake Kenogami, between Chicoutimi and Lake St. John, at the head of the Saguenay.

P. campanulatus.—Renfrew on the Bonnechere River, Montreal, and in shell marl from near Philipsburgh, St. Armand and St. Rose, Terrebonne, and living in Lakes Metis and Matapedia.

P. bicarinatus.—Renfrew, L'Orignal, Montreal, in marl from Ste. Rose, Shefford Mountain and Carleton, Bay of Chaleur, also living in the Ristigouche River.

P. lentus.—Renfrew and near Montreal.

P. parvus.—L'Orignal and Montreal, in marl from Anticosti and several localities in the Eastern Townships; inhabits still water throughout the whole of the Peninsula of Gaspé.

Physa heterostropha.—Mississippi River, L'Orignal, neighbourhood of Montreal, Eastern Townships, and along the south-east side of the St. Lawrence below Quebec as far down as Gaspé Bay. They seem to thrive as well and grow to as large a size in Gaspé as anywhere else. I found a few Physas in some shell marl from Anticosti, which appear to belong to this species.

* Forbes & Hanley, Vol. III. 167; Vol. IV. 271.

P. aurea.—L'Orignal and Carillon on the Ottawa, Lachine Canal, Montreal, and several localities in the County of Rimouski.

P. ancellaria.—L'Orignal and near Rimouski village.

P. elongata.—L'Orignal, Montreal, Green Island, Metis and Ste. Anne (Gaspé.)

Limnæa megasoma.—This fine species was found by Mr. Billings in the Bonnechere River, and by myself in a creek near Hawkesbury Village, where it was rather abundant.

L. jugularis (*stagnalis*).—Plentiful in many streams and small lakes on the south side of the Ottawa and in the St. Lawrence near Montreal, and extremely abundant in the Metis Lakes in the county of Rimouski.

L. caperata.—St. Lawrence near Montreal, and very plentiful in Lake, Matapedia.

L. umbrosa.—Common in ponds between Montreal and Lachine, and near Ste. Anne, (Gaspé) at which place I found an individual having its aperture turned to the left side.

L. elodes.—This is by far the most common Limnæa inhabiting stagnant waters in the Ottawa valley and about Montreal, but as it is a variable species, I am uncertain whether it occurs or not among those collected below Quebec.

L. catascopium.—Rimouski, Ristigouche and Dartmouth Rivers.

L. opacina.—St. Lawrence, between St. Nicolas and St. Antoine; alive and pretty abundant at low tide at Point Levi, in the Metis River above the high fall, Rimouski and White Rivers.

L. acuta.—This is the most abundant species in the shell marl from Marl Lake, Anticosti.

Ancylus rivularis.—Old quarries near the mile end toll-gate, Montreal.

Paludina decisa.—South Nation River, L'Original, Lachine Canal and St. Helen's Island.

Melania acuta.—St. Lawrence, near Montreal and Varennes.

M. Niagarensis.—Same localities.

Amnicola porata.—Occurs in marl from the Lachine railway and Shefford mountain, and was found living in Little Lake, Matapedia (County of Rimouski.)

Valvata tricarinata.—Abundant in marl from Philipsburgh, St. Armand and the Lachine railway, and inhabits Lake Matapedia.

V. sincera.—Marl Lake, Anticosti.

(Terrestrial.)

Helix alternata.—This is perhaps the most widely diffused species of the land snails found in Canada. It occurs abundantly on both sides of the Ottawa, at Montreal, Point Levi opposite Quebec, and down the south-east side of the St. Lawrence into Gaspé, and is common over the whole peninsula as far as my observations extended, at Dalhousie, N.B., and along the Ristigouche River.

H. albolabris.—One of the most common species in the Ottawa Valley, at Montreal and Point Levi, but does not extend so far down as the County of Gaspé, having been last observed on the coast of Metis. It was, however, found at Lake Matapedia, 25 miles south-east of Metis, and was extremely abundant at Dalhousie and along the Ristigouche as far up as the mouth of the Patapedia.

H. monodon.—Very abundant under stones in pasture fields near L'Orignal and in the augmentation of Grenville, Montreal mountain, Point Levi under decaying leaves lying on disintergated shale, but was not found further down the St. Lawrence. Not having collected a single individual of this species during the previous part of the summer while travelling in the northern part of the district, I was astonished on coming to the Ristigouche to find them in the greatest profusion in many places along that river, as well as at Dalhousie.

H. exoleta.— One specimen found on the Ristigouche about five miles above the mouth of the Matapedia.

H. tridentata.—Montreal mountain, rare.

H. concava.—A few specimens found near L'Orignal and on the Montreal mountain ; plentiful at Point Levi.

H. hortensis.—It seems scarcely credible that this species has been imported from Europe, considering how widely diffused and vastly numerous it has become along the Lower St. Lawrence. On the main land it was first observed on Mount Commis, about nine miles south of St. Luce and on the coast at Metis, where it was abundant, and below which it seems to occupy the place of *H. albolabris*, but is generally much more numerous. In 1857 I found vast numbers of them on the Brandy Pots and Hare Island in the middle of the St. Lawrence opposite Rivière du Loup. The climate of Gaspé seems to be very favourable to their propagation, as they appear to have spread over the country for a considerable distance inland. The yellow and banded varieties

seem to be about equally numerous. Where land has been recently cleared and burnt over, their withered shells may be seen strewed in thousands over the surface of the soil. In the valley of the Marcouin they were observed to extend 12 miles inland, which was farther than at any other place. The height at which the last specimen was found was about 1500 feet above the sea, as indicated by the barometer which we had with us. The young from the size of a grain of duck shot to half that of the adult shell were met with in our journey up this valley in the end of July.

H. arborea.—This and the next species are probably the most abundant snails in the Ottawa valley and all along the Lower St. Lawrence from Kamouraska to Gaspé Bay, and in every part of the peninsula which we visited, and also around Lake St. John at the head of the Saguenay. Both these species exist on the Island of Anticosti, as I found specimens of them imbedded in fresh-water shell marl which Mr. Richardson brought from there in 1856. They are amongst the commonest land shells at Montreal and Point Levi, although they may not appear to be so owing to their small size.

H. striatella.—Found everywhere with the preceding species.

H. lineata.—L'Orignal, Augmentation of Grenville, Carillon, Montreal Mountain, and in many localities along the St. Lawrence from Berthier to Marsoni River, Gaspé.

H. labyrinthica.—L'Orignal, Rivière du Loup (en-bas), Green Island, and a few localities in Gaspé.

H. pulchella.—Carillon, Montreal, Berthier, mouth of Magdalen River and Dalhousie.

H. electrina.—Carillon.

H. chersina.—L'Orignal, Trois Pistoles, Ste. Anne, Marcouin, Magdalen River and mouth of the Matapedia.

Bulimus lubricus.—Montreal, Rivière du Loup, Trois Pistoles, Metis Lakes and Campbellton, mouth of Restigouche River.

B. harpa.—Metis, mouth of Magdalen River, and very abundant in the Marsoni valley.

Vitrina pellucida.—Rivière du Loup, Trois Pistoles and Ste. Anne.

Succinea ovalis.—L'Orignal, Metis, Matan and Ste. Anne.

S. avara.—L'Orignal, Matan, mouth of Magdalen River, and along the Ristigouche, near the mouth of the Patapedia.

S. obliqua.—Abundant in the Ottawa valley, at Montreal,

Point Levi, all along the south-east side of the St. Lawrence from Rivière du Loup to Gaspé, and in nearly every place examined in the interior of the peninsula or on the Ristigouche.

Acephala (Marine).

Pholas crispata.—Dead specimens were found at Bic Harbour, Rimouski, and near the Trent.

Saxicava rugosa.—Abundant living in stiff mud at Les Islets and at Ste. Anne in Limestone, nullipore and the roots of a large green sea weed with perforated fronds (*Agarum Turneri*). Empty specimens were collected at Cape Chatte, Marsoni and Glande.

Mya arenaria.—Found abundantly in every favourable locality along the whole coast. In ascending the river they gradually become smaller as they approach the fresh water, and probably extend only a short distance above Rivière Ouelle, where, after searching for some time I found only one small living specimen. In the Bay of Chaleur they seem to be as large as on the north coast of Gaspé.

M. truncata.—Fresh valves numerous along the shore at Bic, Rimouski and St. Luce. Numbers of fine specimens found at different places between Metis and the Trent; valves dredged at Ste. Anne and Marcouin.

Glycimeris siliqua.—CapeChatte,RuisseauVallée and Marcouin.

Osteodesma hyalina.—Ste. Anne, several very fine specimens from stomachs of flounders.

Machaera costata.—Very common at Rimouski.

Solen ensis.—Bic, Rimouski, St. Luce, Cape Chatte, Ste. Anne, and extremely abundant at Grande and Peter Rivers.

Tellina proxima (*calcarea*).—Ste. Anne, Ruisseau Vallée and Marcouin, stomachs of haddock.

T. Groenlandica.—More or less abundant along the whole coast. In 1857 I found this species at Bay St. Paul, on the north-west side of the St. Lawrence only, about 55 miles below Quebec, which is probably the nearest approach of the living marine shells to their fossil ancestors in the Post Pliocene deposits in the Ottawa Valley, some of which are nearly 400 miles distant.

Mactra ovalis (*ponderosa*).—First met in Bic Harbour, but becomes very abundant at Rimouski, 12 miles farther down. Occurs at Metis and Ste. Anne, and in the coves at the mouths of Marcouin, Glande and Mont Louis Rivers.

Mesodesma arctatum.—Dead specimens were found as far up

as Green Island, and the first living ones at Bic. This species probably ranks next to Mytilus edulis, in abundance along the south-east side of the Lower St. Lawrence. In an ancient sea beach between Metis and the Trent, about 15 feet above the present sea level, these shells are found in heaps and mixed with sand and fragments of other shells, the same as along the present shore. some imperfect valves were found at Matan in a bed of sand near the top of the 50 feet terrace occurring there.

Venus mercenaria.—Specimens in Sir W. E. Logan's collection from the Gulf; occasionally found among oysters from Carraquette.

V. gemma.—Very abundant at low tide in coarse sand around the islets between Green Island and the main land.

Aphrodite Groenlandica.—Abundant at Bic and Rimouski. At the latter place a fine specimen more than three inches long was procured. Plentiful in flounders stomachs at Metis, Ste. Anne and Ruisseau Vallée.

Cardium Islandicum.—A valve was found in Bic Harbour, and another at Rimouski. Common in stomachs of flounders at Metis and Ste. Anne, these shellfish, which were sometimes found alive in their maws, seem to constitute their principal food; their average size was two inches in length.

Cardita borealis.—Dredged at Marcouin and found in fishes maws at Capuchin, Ste. Anne and Ruisseau Vallée.

Astarte sulcata.—Rare at Bic Harbour, Cape Chatte, Ste. Anne and Rouisseau Vallée, but was one of the commonest shells dredged in 60 fathoms off Marcouin. Among the Marcouin dredgings were a number both of living and dead specimens of a variety or perhaps a distinct species which bear a very close resemblance to A. Laurentiana, the common species of the Post Pliocene deposits near Montreal, and which differs in many respects from A. sulcata.

Lucina flexuosa.—Ste. Anne, Ruisseau Vallée and Marcouin; stomachs of haddock.

Lima subauriculata.—One specimen of this rare and beautiful species was found in the stomach of a haddock at Ste. Anne.

Mytilus edulis.—Found farthest up the St. Lawrence at Kamouraska and gradually becomes more abundant in descending the river. The largest individual found on the Gaspé coast is $3\frac{3}{4}$ inches long. In the Bay of Chaleur they are much wider posteriorly than in the St. Lawrence, they resemble the fossil variety, but are generally either straight or concave along the ventral margin.

Modiola discors (Linn.) *discrepans* (Lam.)—Ste. Anne, found in great numbers adhering to the roots of large Algae (*Agarum Turneri*) which were thrown up on the beach by a violent storm. As many as a dozen individuals were sometimes attached to the base of the same sea weed, each completely enveloped in its great bissus. Of about 200 specimens which I obtained in this way, the largest is 1 inch, $5\frac{1}{2}$ lines long and 10 lines high. The large shells are of a very dark colour. Some living specimens were dredgd in the Marcouin cove.

M. plicatula.—Numerous specimens in Sir W. E. Logan's collection from the Gulf.

M. Glandula.—Common in stomachs of flounders and haddock at Ste. Ann, Ruisseau Vallée and Marcouin, and many living specimens were dredged in about 60 fathoms off the latter place.

M. pectinula.—Three specimens were obtained among fish offal at Ruisseau Vallée.

M. nexa, (Gould).—Ruisseau Vallée, one specimen from same source.

Leda limatula.—Very abundant in stomachs of flounders and haddock at Capuchin, Ste. Ann, Ruisseau Vallée, Martin and Marcouin Rivers.

Nucula tenuis.—Capuchin, Ste. Ann, and Ruisseau Vallée, in stomachs of haddock, rare.

Pecten Magellanicus.—Glaude River, Gaspé. Fragments of valves were collected at Ste. Ann and two specimens obtained from fishermen of the same place who brought them from the north shore directly opposite. In 1844 Sir W. E. Logan brought a great number of specimens of this species from the neighbourhood of Cape Gaspé.

P. Islandicus.—First occurs near Metis where numbers are frequently found in fishes' stomachs. While at Ste. Ann, I collected upwards of 170 specimens of this species, presenting a great variety of beautiful tints of red and pink colouring, from the stomachs of flounders which the inhabitants had taken when fishing for cod, and spread on their fields for manure. The fishermen frequently haul up large and beautiful specimens on their hooks with the valves closed on the bait. Some good living specimens were dredged at Marcouin in about 30 fathoms, and they were found in abundance in the stomachs of flounders at all the coves visited on the coast below Ste. Ann. The largest specimen from Ste. Ann is 3 inches and 8 lines in height and there are a

number more nearly as large, I have also a specimen from the Island of Anticosti.

Anomia ephippium.—Ste. Ann, adhering to the dorsal valves of Pecten Islandicus; also dredged at Marcouin.

Terebratula psittacea.*—Common in the stomachs of flounders and haddock at Ste. Ann. At Ruisseau Vallée I procured more than 130 fine specimens of this shell in a spot where there had been a heap of fish offal, but all the soft matter having decayed away, nothing remained but the bones of the fish and the shells which their stomachs had contained. A considerable number of living specimens were dredged in 60 fathoms off the mouth of the Marcouin River. There were also many valves and imperfect specimens in the material dredged here, showing that this species is very plentiful on the Gaspé coast.

Tunicaries of the genus Assidium were very common between Cape Chatte and Ste. Ann.

(Fresh Water.)

Unio radiatus.—Very abundant in the Ottawa and some of its tributaries from Ottawa City downwards in the Lachine Canal and the St. Lawrence in the vicinity of Montreal. Mr. Billings has a number of specimens of this and the next species from Lake Nipissing.

U. complanatus.—Lake Nipissing, Ottawa River, Lachine Canal and the St. Lawrence as far down as Berthier below the Island of Orleans, where the last living specimen was obtained, but valves both of this and the preceding species were very frequently found on the beach all the way down to Gaspé. Abundant in Lake St. John, and said to inhabit the Little River St. Margarite on the north shore opposite Ste. Ann, Gaspé.

U. gibbosus.—Very abundant in the Ottawa at L'Orignal, and on St. Helen's Island, Montreal.

U. ventricosus.—Bonechere and Ottawa Rivers, Lachine Canal and St. Lawrence near Montreal.

U. ellipsis.—Culbute, (the channel between Calumet Island and the north shore of the Ottawa) and St. Helen's Island.

U. rectus.—Culbute, Ottawa near L'Original, Lachine Canal and St. Helen's Island.

U. alatus.—Common in Ottawa at L'Orginal, where I once caught a large specimen with a baited fish-hook in about ten feet of water.

---

* (*Hypothyris.*)

Margaritana rugosa.—South Nation River, Lachine Canal and St. Helen's Island.

M. marginata.—Culbute and St. Helen's Island.

M. arcuata (*margaritifera*).—Green and Rimouski Rivers, Lake St. John and both the Matapediac Lakes.

M. undulata.—Culbute, L'Original and St. Helen's Island.

Anodouta subcylindracea.—Lachine Canal, Grand Lac about 10 miles south of Rimouski, a small lake 6 miles southwest of of Grand Metis, Lakes Matapedia and St. John.

A. pavonia.—Very abundant in the creek at L'Original and in old quarries near the mile end toll-gate, Montreal.

A. fluviatilis?—Ottawa near L'Orignal and Lachine Canal.

Cyclas similis.—Very abundant in the creek at L'Original, Lachine Canal, Metis Lakes and a pond 6 miles S. W. of Metis.

C. Orbiculata.—St. Lawrence near Montreal.

C. Dubia.—Ottawa City, Carillon, Montreal, Point Levi, Mare Lake Anticosti, Eastern Townships, and throughout the eastern peninsula of Lower Canada.

Besides the above 128 species of recent shells occurring in Canada, there are in the collection of the Geological Survey many more, the names of which have not yet been determined. I hope to be able to give a list of these in a future number of the Naturalist. Principal Dawson has kindly undertaken to name the Tubicolae, Bryozoa, Foraminifera, &c., dredged on the north coast of Gaspé, and will publish a list of them in another number of this magazine.

(*To be continued.*)

ARTICLE XVII.—*Geological Survey of Canada.—Figures and Descriptions of Organic Remains.* Decades 1 and 4.

Decade 1st is the work of Mr. Salter, the excellent paleontologist of the Geological Survey of Great Britain, to whom, many years since, Sir Wm. E. Logan committed a collection of the remarkable silicified shells of Pauquette's Rapids on the Ottawa, and who accordingly now describes these shells, acting, as he says, as pioneer for Mr. Billings.

This decade commences very appropriately with the remarkable and mysterious *Maclurea Logani*, a shell in which the name of the father of American geology is associated with the greatest name in Canadian geology; but which the zoologists have yet

failed satisfactorily to assign to its place in the system of nature. The genus belongs almost to the dawn of life on our planet, being found in the oldest silurians both in Europe and America. The species here described is a fine discoidal shell, looking like a broken volute from an Ionic column; but where one might look for the fractured surface, is a curiously marked spiral operculum or lid strongly marked with the apophyses, by which the ancient tenant held fast his door when pressed with danger from without. An ordinary observer might pass this shell as like a Nautilus or a Planorbis; but its flat lower side, its sunken upper side, and its singular operculum, strike the eye of a conchologist, and are unlike anything in the modern world. At present it is placed near to the *Atalantæ*, small thin shells inhabited by a peculiar tribe of sea snails (Heteropods). But the *Maclurea* was a thick heavy shell, and its animal, though, perhaps, more like the *Atalantæ* than other modern creatures, must have differed very materially from them.

In collections of tropical shells one sometimes sees specimens of the beautiful but fragile *Ianthinæ* or violet snails, which swim in immense multitudes on the ocean, floating by means of a singular raft of air vesicles secreted by the animals, and to the bottom of which their eggs are attached. In the old silurian seas multitudes of similarly constructed shells are found, probably inhabited by animals of like nature. They are usually, however, in a condition which does not admit of satisfactory examination, except as to the general external form. But in the limestone of Pauquette's Rapids the shell has been replaced by silica, and this when exposed by the weathering of the softer enclosing rock or by the action of an acid, represents the original organism as if just picked up on the beach. Many of the beautiful forms thus revealed are represented in this decade.

Other floaters of that period, but of somewhat higher organization, are represented by the genus *Cyrtoceras*, the floats of certain old cuttle fishes, which, perhaps, preyed on their Atlanta-like companions, as they no doubt devoured Paleozoic medusæ and other soft creatures, whose remains have perished. Other shells, bivalves of the genus *Ctenodonta*, humble burrowers and creepers like our *Arcas* and *Nuculas*, and fortified like them with a long row of interlocking teeth in the hinge, take us down to the oozy bottom of the Paleozoic seas, where also many univalves, not unlike modern *Littorinas* and *Pyramidellids*, — the *Cyclonemæ*, and *Lozonemæ*—creep and perhaps feed on sea weeds.

A very interesting point, which is the burthen of this decade, is the fact that in the limestone of Pauquette's Rapids, as elsewhere in Lower Canada, the fossils which in New York are divided among the Chazy, Trenton, Black River, and Birdseye limestones, co-exist in a single bed, indicating no doubt a greater uniformity in the condition of the sea bottom.

Mr. Salter's decade closes with a notice of a singular genus, which has hitherto puzzled paleontologists, the *Receptaculites*, long since figured by Hall in the fossils of New York, but of which new species have been found in Canada and Australia, Mr. Salter regards it, notwithstanding its comparatively gigantic size, as belonging to Foraminifera and allied to the genus *Orbitolites*. The conjecture is clever and not improbable; and, if true, it will not only give the Foraminifera a great antiquity, but show that, like some other families, they began to exist in gigantic forms unequalled by their degenerate successors.

Decade 4th is the work of Mr. Billings, and describes all "the crinoids of the silurian rocks of Canada, of which specimens have been procured, in such a state of preservation, as to admit of their being characterized";—about fifty species in all. Mr. Billings very properly prefixes to his description of the species, an introductory account of their organization, so plain and clear, that no one can find much difficulty in studying these curious fossils after reading it. The crinoids are stalked starfishes, of so curious and complex organization, that they attracted the popular fancy long before there was any science of geology. They furnished the old Britons with natural necklaces, and they have been known as "fairy stones," "St. Cuthbert's beads," "screw stones," "pulley stones," and lastly, as "stone lilies." When perfect, the typical crinoid presents a long flexible column or stalk made up of a series of flattened beads, curiously worked into articulating surfaces where they touch each other, and penetrated by a central perforation, through which extends a continuation of the body of the creature. On top of the stalk was a cup, made up of a number of ornamented plates, joined at the edges, and containing the viscera of the animal. From the edges of the cup sprouted forth jointed arms extending around and serving as organs of prehension; and in a cover of smaller plates, probably often flexible, was the mouth, extended sometimes into a tubular proboscis.

The particular description of their parts, given by Mr. Billings, is worthy of being extracted here, for the benefit of students and collectors.

I. *The Column or Stalk.*

"The column usually consists of a long and slender cylindrical stalk, composed of numerous short joints, so closely articulated together, that, during the life of the animal, it must have possessed a very considerable amount of flexibility. It seems probable that in species where the joints are alternately large and small, as in *Glyptocrinus*, there was a greater degree of pliancy than in those instances where it is formed of thin, equally large circular plates, as in the lower part of the appendage in *Rhodocrinus pyriformis*. In the Corniferous limestone smooth round columns one inch in thickness are often found, and these are so firmly constructed, that they must have stood upright, supporting the body of the Crinoid, as upon the top of a pillar. The columns are either pentagonal throughout their whole length, or pentagonal in one part and round in another, or altogether round and smooth. In all the species they are perforated from top to bottom by a small central canal, which is also either circular or pentagonal. This canal no doubt served the purpose of conveying the nourishment from the interior of the body to every part of the column, by which its growth was provided for. In nearly all Crinoids the lower extremity of the column was attached to the bottom of the sea or some other solid object, such as pieces of floating timber, either by a number of branching rootlets, as in *Rhodocrinus pyriformis*, or by a broad, solid base, as in *Cleiocrinus regius*. I think however that certain Lower Silurian species were free, and moved about through the water, dragging their columns after them. I have seen at least a hundred columns of *Glyptocrinus ramulosus* with the lower part preserved, and could never discover any signs of an attachment. In this species the column at the upper end is often half an inch in thickness, and it tapers gradually to half a line at the lower extremity, a short piece of which, when found perfect, is always closely curled up, like a miniature coil of rope. I think also that sometimes the attached species had their columns broken off by some accident, and that the animal lived long afterwards free, but with a portion still connected with the body. I have seen specimens of *Rhodocrinus pyriformis* with from six to ten inches of the column attached to the base of the cup, with the terminal joint where the fracture occurred rounded, and the alimentary canal closed, or, as it were, healed up. There does not appear to be any way of accounting for this condition of the column, unless upon the above supposition.

"The species of the genus *Comatula* now living, all of which are true Crinoids, are attached while young, but free in the adult state. The invaluable observations of Thompson on this genus will, as already stated, be found at the end of this Decade. The *Marsupites* of the Chalk which have no column were also free Crinoids."

II. *Side-arms or Cirri.*

"The side-arms or cirri are long, slender-jointed appendages, attached to the column, the purpose of which does not appear to be well understood. They have not yet been found on any of the Lower Silurian species. Some of them are represented in the figures given at the end of this Decade, in the article upon *Comatula.*"

III. *The Basal Plates.*

"The base of the cup consists of a set of plates arranged in a circle on the top of the column, and in some species where they are large constitutes a saucer-shaped support of the viscera, to the centre of the bottom of which support the column is attached. This part of the skeleton has usually been called the pelvis. In nearly all the Lower Silurian species there are five basal plates; in the Upper Silurian, species with three or four are not uncommon; while in the Devonian those with five plates are comparatively rare."

IV. *The Sub-radial Plates.*

"These are always five, and constitute a row resting upon the upper edges of the basals. They occur in the genera *Palœocrinus*, *Dendocrinus*, *Porocrinus*, *Carabocrinus*, *Rhodocrinus*, and others. In *Glyptocrinus*, *Heterocrinus*, *Thysanocrinus*, *Hybocrinus*, and *Cleiocrinus*, there are no sub-radials, the rays springing immediately from the basals."

V. *The Rays and Radial Plates.*

"In all Crinoids there are five rays, the lower plates or extremities of which are included in the structure of the cup and form part of the shell, while the upper portions are prolonged above the body, and constitute the arms, which are generally free and more or less branched. In *Rhodocrinus* and *Glyptocrinus* each ray consists at first of a single series of three plates, sometimes called the primary radials or simply the radials; it then divides into two series, called the secondary radials. In these two genera the primary and secondary radials enter into the composition of the

cup. In *Glyptocrinus* the first or lowest primary radials rest upon the upper edges of the basal plates, alternating so that each ray is supported by the contiguous sides of two of the basals. In *Rhodocrinus* there is a series of sub-radials between the basals and primary radials. In such genera as *Palæocrinus*, *Carabocrinus*, *Dendrocrinus*, and *Porocrinus*, the first primary radial only is included in the walls of the cup, but the second plate and all above it are free. In the very remarkable genus *Cleiocrinus* the primary, secondary, tertiary, quaternary and quinary rays are all firmly connected together, the free arms commencing with the sixth or seventh division."

"The student will find many other modifications of the radial system of the Crinoideæ by consulting various palæontologists; but the above are the more common ones, and those most prevalent in the Lower Silurian of Canada."

VI. *The Inter-radials.*

"The divisional space between two rays is called an inter-radius; and as there are five rays, there must be of course an equal number of inter-radii. Four of these are always of equal size, and are called the "regular inter-radii," and when they contain plates these are designated the "regular inter-radials." The fifth is larger than either of the other four, and is called the "azygos inter-radius," from the Greek *azugos*, "unyoked," or "not paired.' The plates in this inter-radius are called the azygos inter-radials. In most works the "azygos inter-radials" are termed "anal plates," but as they are not anal plates, I think another name preferable. The *azugos inter-radials* always mark the anterior side of the animal or that side towards which the mouth is most approximated. The posterior is directly opposite, and indicated by the azygos ray. There are thus in every Crinoid two pairs of rays, the right and the left, and an odd or azygos ray. There are also two pairs of inter-radii, the right and left pairs, and an odd one, which is the azygos or anterior inter-radius. When a Crinoid is placed with its anterior side towards the observer, the left anterior ray is opposite his right hand and the right anterior ray opposite his left. Such genera as *Glyptocrinus* and *Rhodocrinus* have both regular and azygos inter-radials, but *Palæocrinus*, *Carabocrinus* and others of a similar structure, have only the latter."

VII. *The Mouth, Ambulacral Grooves, and Ambulacral Orifices.*

"The space on the upper part of the body surrounded by the arms is called the ventral surface, and, by some authors, the vault. It is covered with plates, which are usually smaller than those of the walls of the cup, and disposed without any observable order. The mouth is a circular or oval aperture, situated either in the centre of the vault or between the centre and the margin of the cup, towards the anterior side or below the margin in the side. It sometimes consists of a tube called the proboscis," which rises from two or three lines to more than an inch above the surface. In some species, such as *Caryocrinus ornatus* (Say), it is closed by a valvular apparatus consisting of five or six small triangular plates. In *Pentacrinus caput-Medusæ* there is a central orifice, and, proceeding from it, five ambulacral grooves on the surface of the vault, which radiate outwards and divide into ten before reaching the margin. The ten grooves proceed straight to the bases of the ten secondary rays or free arms, and are continued upon them to their extremities. The main grooves send out branches to all the divisions of the arms and to each of the pinnulæ. The grooves throughout their whole length are covered over with a soft skin, through which there are numerous minute circular perforations arranged in two rows, one along each side of the groove. These orifices are supposed to be passages for the fluid which serves to extend or retract a set of small sucking feet which are visible on the outside, one over each orifice. The margins of the grooves are bordered by small erect moveable plates, which extend along the sides like a fence of minute palings. These are the *marginal plates* of the *ambulacral grooves.*"

"The grooves are covered passages, along which are conveyed from the interior of the body to the arms and pinnulæ a number of tubular vessels whose functions appear to be of great importance in the physiology of the Crinoids. As the eggs from which the young are produced are developed in the pinnulæ, no doubt there must be an organ of some kind connected with their generation which communicates with the viscera of the animal by passing along the grooves. Another set of vessels are the aquiferous canals, consisting of long, slender tubes for the conveyance of the fluid by which the sucking feet of the arms and pinnulæ are extended or retracted. To these must be added the blood-vessels, nervous filaments, and muscles. Traces only of these have been actually observed, but the almost perfect identity in structure be-

tween the ambulacra of the Crinoids and those of the Star-fishes, in which it is well known that such organs do exist, renders it quite certain that the former as well as the latter are provided with a full set of ambulacral vessels."

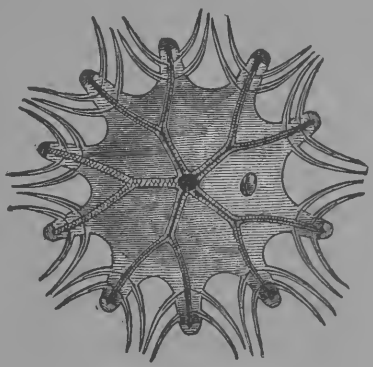


Figure 1.

Figure 1. Diagram of the ventral surface of *Pentacrinus caput-Medusæ*. The central orifice is supposed to be the mouth; the other, the anus. One of the grooves is represented as being closed over by the marginal plates.

"In many of the extinct species of Crinoids, although the arms and pinnulæ are grooved, yet there are no grooves leading from the bases of the arms to the mouth; and it therefore becomes probable that the ambulacral vessels of the arms and pinnulæ do not enter the body through that orifice. Indeed in a great many species, as the mouth is situated in the top of a tube which is sometimes longer than the arms and rises above them, it seems impossible that they could gain access to the interior by that route. Accordingly a more direct passage is provided. In a great many species which have no calycinal grooves there is an aperture at the base of each arm in which the groove of the arm terminates I think that in such species the ambulacral vessels, after descending from the extremity of the arms to the bases of the arms, pass directly into the body through these apertures. I have therefore, in Decade III., proposed to call these the *ambulacral orifices*."

The Decade contains descriptions of many new forms, some of them, as is the case of the remarkable *Blastoidocrinus carchariœdens*, worked out for the first time, and in a most able manner, by the author of the Decade. These descriptions it is impos-

sible to condense or analyze; but the work itself is on sale at a price which places it within reach of any one.

The engravings in the first Decade were executed in London. Those in the fourth have been done in a less expensive but equally effective style in Montreal, the drawing on stone being the work of Mr. Smith, an artist attached to the Survey, and the printing by Mr. Matthews.

J. W. D.

REVIEWS.

The Naturalist in Bermuda; a sketch of the Geology, Zoology, and Botany of that remarkable group of Islands, together with meteorological observations. By I. M. Jones, Esq., middle temple, assisted by Major J. W. Wedderburn, and J. L. Hurdis, Esq. With a map and illustrations; London, Reeves & Trubner. Montreal: B. Dawson & Son pp. 200.

This is a very creditable production considering that it has been written by one whose residence on the islands was but brief. The author has been largely indebted for many facts and incidents to amateur Naturalists, whose local knowledge and observation are both accurate and extensive. The book gives a brief account of the Geology of these curious islands abridged from the first paper ever published on the subject, by Col. Nelson, R. E., and printed in the transactions of the Geological Society of London. Probably not much more than what is contained in that paper, can be said of the calcareous rocks of which these islands are composed. A more minute examination would, however, we believe lead to interesting conclusions, as to the physical changes of which they have been the theatre. The whole group is made up of curiously formed croralline arenaceous rocks, some parts of which are of a finer grain and more indurated than others, they are in fact, just a series of petrified sand hills. The most interesting part of this book is that in the department of Ornithology. It occupies about a third part of the volume, and contains a pretty accurate enumeration of the species to be found from time to time on the islands; several valuable notices are given concerning the migrations of the migratory birds. Very few birds are permanent residents in the Bermudas, but immense numbers are known at particular seasons, to rest there as they pass to the South and North. Most of these latter are natives of the American Conti-

nent. Only a few European species find their way there, and these evidently driven by stress of weather. One fact new to Zoology which this book contains is the roving or migratory habit of the Genus *Vespertilio*, two species have been found though rarely upon the island, (*V. Pruinous and V. Noctivagans*) and neither are known to be residents or to breed there. They would thus appear to have much greater powers of sustained flight than are generally supposed. These notes would have been more valuable for scientific purposes had they contained a good classification of the species so arranged as to indicate the permanent and the migratory species, and those which visit the islands on both their southern and northern migrations or on either only. A very limited account is given of the fish tribe. The most noticeable are described, and the popular names of others given. We are not aware that any of the fish caught in these waters are peculiar to them. They may all we believe, be found either on the American coast or in the West Indian Archipelago. A most interesting monogram might be written on this department alone. The Zoology of the waters, while by far the most interesting, is but slightly treated of in this book. A few notices are given of the Crustaceans and the Molluscs, and these by no means very scientific in their character, but nothing at all is said of the innumerable Medusae which infest the waters, of the Echini and Asterias, to be found in all the sheltered bays and creeks; of the Actiniae with which the rocks are every where brilliantly adorned; of the polypi, the great builders of the islands and the manufacturers of its beautiful corals; of the Bryozoa of which there are many fine species. Neither is any notice whatever taken of the magnificent marine botany which is so remarkable a feature of the natural history of these Islands. Much therefore remains to be done ere the "still vex't Bermoothes" can be said to have their own monograph. What this book contains is an important and interesting item of their natural history not by any means to be despised. Its author is remembered by the Mudians as an earnest and enterprising entomologist, and during his brief stay is known to have made the best use of his time. In the department of Botany the names and characters of the most valuable plants and trees are given, but much remains to be done. A small *hortus siccus* in the public library of Bermuda would have furnished the author with several species not named in this book. Another edition is however promised, and communications are invited relating to

the Natural History of the islands. If such is ever published, the defects we have noted may be remedied, and adequate justice done to the flora and fauna of these beautiful islands, which are in truth a very paradise of Natural History. As a contribution to science containing much that is original and interesting, we cordially recommend this little book to our readers. A. F. K.

The Microscope: being a Popular Description of the Most Instructive and Beautiful Objects for Exhibition. By L. Lane Clarke. London, G. Routledge & Co.; Montreal, B. Dawson & Son. pp. 231.

This is a most useful book as an accompaniment to the microscope and the object-box. Its object is to give simply that knowledge of vegetable and animal physiology which will enable the young student to understand the nature of the prepared objects, and excite the desire to learn more from better books. It is in fact an index and descriptive catalogue of the numerous animal and vegetable organisms whose beautiful structures have been unfolded by skillful preparation under the microscope. Now that so much interest is taken in microscopic studies, and that good instruments are becoming common ornaments of the drawing-room and useful companions in the study, a book such as this becomes necessary for intelligent and profitable observations. The first part treats in a familiar and popular way of the use of the microscope, and gives good practical directions for the mounting and preparing of objects. The other parts treat successively, and with great accuracy, of objects from the vegetable kingdom which comprise a wide range of vegetable physiology, —objects from the animal kingdom in which much that is interesting in the structures of insects and zoophytes is described and noted. The book concludes with a good index, and with a pretty extensive catalogue of microscopic objects prepared and sold by Charles Baker, optician, London. While this book belongs more to the department of manufacture than of science, it yet embraces much that is of scientific interest and value. For amateurs and the young it will be found most suitable. Among the number of introductory and popular books now issuing from the press of Europe and America on the subject of the microscope, this may be numbered as one worthy of commendation, and may safely be recommended to the attention of our readers. A. F. K.

Curiosities of Natural History. By Francis T. Buckland, M.A. From the fourth London edition. New York, Reid & Carleton; Montreal, B. Dawson.

This book is written by a son of the late celebrated Dr. Buckland. It is of a most miscellaneous order. The most of it was written for popular London periodicals and partakes of the lively style peculiar to such writing. It makes no pretensions to a scientific treatment of its topics. It aims, if we may so speak, at something higher than this,—at exhibiting the life of certain curious and well-knowu animals. The author has been a keen observer of the habits of animals, and has taken note of many striking features in their habits which came under his notice. He has in this way made a really delightful gossiping book, full of humour and anecdote, and very accurate in its illustrations, analogies, and anecdotes. The four chapters treat of frogs, rats, serpents, fish, and monkeys,—a sufficiently miscellaneous and odd group of creatures. Besides his own observations, the writer has gathered together numerous curious incidents and anecdotes from the writings of others, illustrative of the habits and instincts of these animals. This is an illustration of how much interest and amusement may be derived from the study of natural history. It makes evident the fact that we do not need to travel far for objects of interest. There is no living creature a minute knowledge of whose peculiarities would not be interesting were they accurately observed and noted. We can recommend this book as containing a most lively, humorous, and instructive account of the peculiarities, affections, and instincts of an interesting circle of animals.

MISCELLANEOUS.

A List of Birds found in Upper Canada. By T. Cottle, Esq., Woodstock, C. W.

This list cannot be considered perfect, being only such as have come under my own observation, and is, I am aware, most deficient in the small warblers and sparrows:—

1. Buteo Borealis.
2. B. lineatus.
3. Aquila chrysætos.
4. Haliætus leucocephalus.
5. Pandion Haliætus.
*6. Falco Sparverius.
7. Accipiter palumbarius.
8. A. Cooperi.
9. A. Pensylvanicus.
10. Surnia funerea.

* F. Peregrinus and F. Columbarius, I believe, are also found, but have not come under my own observation.

11. S. nyctea.
12. Ulula Acadica.
13. Syrnium cinereum.
14. S. nebulosum.
15. Otu vulgaris.
16. Bubo Virginianus.
17. B. Asio.
18. Caprimulgus vociferus.
19. C. Virginianus.
20. Chætura pelasgia.
21. Hirundo purpurea.
22. H. viridis.
23. H. fulva.
24. H. rufa.
25. H. riparia.
26. Tyrannus intrepidus.
27. T. crinitus.
28. Tyrannula fusca.
29. T. virens.
30. Muscicapa ruticilla.
31. Sylvicola coronata.
32. S. icterocephala.
33. S. Blackburniæ.
34. S. æstiva.
35. Trichas Philadelphia.
36. Certhia familiaris.
37. Parus atricapillus.
38. Regulus Satrapa.
39. R. Calendula.
40. Sialia Wilsonii.
41. Orpheus felivox.
42. O. rufus.
43. Turdus migratorius.
44. T. solitarius.
45. Seiurus aurocapillus.
46. Alauda alpestris.
47. Plectrophanes nivalis.
48. Emberizia socialis.
49. E. Canadensis.
50. Fringilla nivalis.
51. F. melodia.
52. F. Pennsylvanica.
53. F. leucophrys.
54. Spiza cyanea.
55. Linaria minor.
56. Carduelis tristis.
57. C. pinus.
58. Pipilo erythropthalmus.
59. Erythrospiza purpurea.
60. Corythus Enucleator.
61. Guiraca Ludoviciana.
62. Coccothraustes vespertina.
63. Pyranga rubra.
64. Dolichonyx orizivora.
65. Molothrus pecoris.
66. Agelaius phœniceus.
67. Icterus Baltimore.
68. Quiscalus versicolor.
69. Sturnella ludoviciana.
70. Corvus corax.
71. C. Americanus.
72. Garrulus cristatus.
73. Lanius borealis.
74. L. ludovicianus.
75. Vireo olivaceus.
76. Bombycilla garrula.
77. B. Carolinensis.
78. Sitta Carolinensis.
79. S. Canadensis.
80. Trochilus colubris.
81. Alcedo Alcyon.
82. Picus pileatus.
83. Dendrocopus villosus.
84. D. pubescens.
85. D. varius.
*86. D. meridionalis (?) Linn.
†87. Apternus Arcticus.
88. Melanerpes erythrocephalus.
89. Colaptes Carolinus.
90. Co. auratus.
91. Coccyzus Americanus.
92. C. erythrophalmus.
93. Ectopistes migratoria.
94. E. Carolinensis.
95. Meleagris Gallopavo.
96. Ortyæ Virginiana.
97. Bonasia umbellus.
‡98. Tetrao cupido.
99. Fulica Americana.
100. Gallinula chloropus.
101. Crex Carolinus.
§102. C. Jamaicensis.
103. Rallus crepitans.
104. R. Virginianus.
105. Grus Canadensis.
106. Charadrius vociferus.
107. C. Wilsonius.
108. Tringa arenaria.
109. Totanus macularius.
110. T. vociferus.
‖111. Limosa Hudsonica.
112. Scolopax Wilsonii.

---

* In 1854 I procured a bird which I believe to be this bird, as described by Swainson in a note on Fauna Bor. Amer.

† One specimen only seen in the woods, but not procured.

‡ On the authority of an inn-keeper at Chatham, who asserted that they were occasionally seen in that neighbourhood.

§ A specimen in the collection of W. Poole, Esq.

‖ I have only seen one specimen, which was killed at Long Point on Lake Erie, and is in my possession.

113. S. minor vel Americana.
114. Ardea Herodias.
115. Botaurus lentiginosa.
116. Ardeola exilis.
117. Anser Canadensis.
118. Anas Boschas.
119. A. obscura.
120. A. Americana.
121. A. acuta.
122. A. Americana.
123. A. sponsa.
124. A. Carolinensis.
125. A. discors.
126. A. clypeata.
127. Fuligula ferina.
128. F. valisneriana.
129. F. marila.
130. F. rubida.
131. F. clangula.
132. F. albeola.
133. F. glacialis.
134. Mergus merganser.
135. M. serrator.
136. M. cucullatus.
137. Sterna nigra.
138. Larus Bonapartii.
139. L. occidentalis.
¶140. L. argentatus.
141. Colymbus glacialis.
142. Podiceps cornutus.

Species observed since the above list was prepared :—

Tyrranula Acadica.
Fuligula rufitorques.
Colymbus septentrionalis.
Podiceps Caroliniensis.

NATURAL HISTORY SOCIETY.

Report of the Council for the year 1858.

The revolving year having again brought round the period for the annual meeting of this Society, your Council have, in accordance with custom and constitutional requirements, to report :

That, during the past year, the Building in Little St. James Street, occupied and owned for so many years by the Society, has been sold, and the proceeds applied towards the erection of a more suitable edifice, on ground acquired on advantageous terms from the Governors of McGill College. The new building is situated in the most rapidly increasing part of the city, and contains an extensive *Museum, Lecture Room, Library and Keeper's apartments.*

By the Report of the Curator and Librarian, it will be seen that the specimens and books were removed to the new building in February last, and that, on the 23rd of that month, it was formally opened to the public by a *conversazione*, at which many of our most distinguished citizens were present. The specimens have since been more perfectly arranged, and are now undergoing cleansing and repairing by the Cabinet-keeper, Mr. Hunter. Owing to the increased accommodation which the Museum affords, your Council recommend that steps be taken for increasing the contributions to it. Similar Societies ought to be communicated with, respecting an interchange of duplicate speci-

---

¶ A specimen in immature plumage, in my collection.

mens, of which there is a large number in your collection, and corresponding and ordinary members be advised that donations will be acceptable and publicly acknowledged. Among the additions now being made to the Museum, your Council deem the *Aquarian* and *Microscopic departments* deserving of special notice.

By the Treasurer's Report, it appears that the cost of the new building has been $10,553·75; and that the debt still due upon it is about $3,600, of which $2,400 is secured by mortgage, and the balance, $1,200, including some accounts not yet settled, exists as a floating debt.

The assistance and countenance afforded to similar institutions by European Governments, led your Council to believe that, in a new country like this, the natural resources of which require to be developed, and the tone and character of its society formed, the Legislature, to whom an application was made, would cheerfully have aided the efforts of your society in effecting these desirable ends. But such has not been the case, and, therefore, your Council, impressed with the belief that the pursuits of the natural sciences and literature are not yet fully appreciated here, take this occasion of directing public attention to the pleasure, instruction and recreation to be derived from them.

Whoever has experienced the harass and fatigue of spirit arising from close application of the mental powers for any lengthened time to one absorbing and anxious object, must have felt the craving of the mind for some new occupation which, by a healthful change, might relieve the fatigue and weariness of the overwrought and over-exerted mental organs. This relief is not always to be obtained by absolute rest. The mere cessation of exertion does not satisfy to fell the void created by long and tiring labor on an exclusive subject. Again, when from illness, misfortune, or any other cause, the laborious man of business, or the diligent student, is incapacitated for his accustomed pursuits, how depressing is the langour which attends him in his retirement, unless he has some intellectual resources on which to exercise his otherwise inert and useless powers! Accustomed to other exertions in his ordinary avocations, if he be deprived of these, and no substitute presents itself to take their place, the mind will become wearied and depressed from the very absence of healthy exercise and employment. And if still farther, through success in his avocation, the approach of age finds him retiring from his wonted stirring occupation, and hoping, after a life spent

in the exercise of active duties, to enjoy the blessings of a competency in that rest from labor, which to a mind well regulated and stored with intellectual resources, constitutes the height of earthly enjoyment, and a precious auxiliary means of preparation for the great change to which he is hastening; and if there be no store of intellectual treasure—no pursuit in science or literature to occupy the leisure days and years that remain to him, how listless, at the best, and how full of misery is the interval allotted to him between the cessation of his active employment and the end of his earthly career! These considerations show how important it is to provide a rational and intellectual amusement and relaxation in the intervals of business—in the time of illness or misfortune, and in retirement after the ordinary duties and avocations of life are over.

Of the desireableness of such a provision we have unhappily but too many proofs, in the sad and even fatal results of its neglect. The instances are not few, in which persons suddenly deprived of fortune fly to the stimulus of drink to drown their misery, or become the prey of incurable dejection;—nor of those who retire from business with a competency, hoping to enjoy the remainder of their days in comfort and pleasure, but finding themselves disappointed, become equally afflicted with the *tedium vitre.* On the other hand many examples might be quoted to show how possible it is, without in any way interfering with the ordinary duties of life, to acquire such a knowledge of science or literature as will prove a healthful recreation, not only to the individual but to those around him. Of all the studies calculated to effect that purpose, perhaps that of the natural sciences, and especially of those, usually designated by the term of Natural History, have the highest claim on a community like ours. The animal and vegetable kingdoms, the rocks and the mountains, are open to the investigation of all. The fields and the forest—the lake and the river, as well as the atmosphere we breathe, teem with myriads of beings, the study of whose beautiful forms, structures, functions, habits, modes of formation and distribution is full of interest and instruction, and clearly indicate the endless design and boundless power of the Creator. The Animalcule, whose dwelling is the leaf of a plant, is as perfect in its organization as the most gigantic monster that ploughs the deep or roams the forest. The histology of the most tiny plant is equally complicated with that of the aged oak. Of no less interest is the study of

the rocks that constitute the crust of our earth. The study of both the organic and inorganic kingdoms is indeed a never failing source of instruction and rational amusement in times of leisure, depression or real sorrow.

The Course of Lectures annually delivered under the auspices of the Society commenced on the 1st day of March and were well attended by the public.

The Introductory Lecture was delivered by the President,—Principal Dawson.

2 Lecture—Tuesday, 8th March—By Rev. Dr. De Sola. Subject: "Scripture Zoology."

3 Lecture—Tuesday, 15th March—By W. H. Hingston, M.D. Subject: "Climate of Canada."

4 Lecture—Tuesday, 22nd March—By Rev. A. F. Kemp. Subject: "Fresh Water Algae."

5 Lecture—Tuesday, 29th March—By Professor S. P. Robins. Subject: "Force."

6 Lecture—Tuesday, 5th April—By the Lord Bishop. Subject: "State and prospects of Science and Literature in Montreal."

The Council feel deeply indebted to these gentlemen for their valuable services, and congratulate the Society on the growing interest taken in the lectures by the public, as evinced by the large attendances. They have also much pleasure in referring to the unusually interesting papers which have been read at the ordinary monthly meetings.

The Council have likewise to make special mention of the services of Dr. Fenwick, the Curator and Librarian, in superintending the removal and arrangement of the Library and Museum, and of the exertions of by the Recording Secretary, Mr. John Leeming, and the Treasurer, Mr. James Ferrier, jr., more especially in the erection of the new building

The Council report with pleasure that, during this session of Parliament, the Society has been able to secure such amendments in its charter of incorporation as have long been desired, and which will enable it to act with freedom and energy in carrying out its legitimate purposes; and the thanks of this Society are due to C. Dunkin, Esq., M.P.P., for his very able and disinterested action in this matter, and in superintending the progress of the Bill through Parliament.

The Council have resolved that the By-Laws, with as correct a list as can be made out of Honorary and Corresponding Members, shall be published with the Annual Report

Finally, the Council, in resiguing their charge, beg to express their sanguine expectations respecting the future progress and usefulness of your Society as a scientific and literary institution. They feel assured, that its utility and position only require to be properly explained to this liberal and enterprising community in order to obtain that support which it really requires and undoubtedly deserves.

REPORT OF THE LIBRARY COMMITTEE.

We beg to submit for your consideratiou the Annual Report on the Library and Museum. The Librarian reports, that in the month of August last, he inspected the journals, transactions of societies, and other loose papers, the property of this Society, and on the occasion of the August meeting, submitted for consideration a hastily drawn up report of the many missing numbers of periodicals, and also recommended that all periodicals and papers worth preserving should be bound at the termination of each year.

It is actually necessary that the by-laws regarding the removal of books be strictly enforced. Members have hitherto been in the habit of taking books from the library, and retaining them in their possession for months, if not years, and, as a consequence, many works of great value have been lost.

Early in February, the library and museum were removed to this building. During this removal, Mr. D'Urbain, the sub-curator, rendered efficient service, and in the subsequent arrangement of the specimens and library, much assistance was rendered by our President, Principal Dawson, Mr. D'Urbain, and other gentlemen, who gave considerable time towards that desired end.

Since the occupancy of this building, the Society have secured the valuable services of Mr. William Hunter, who has, since his appointment, opened all the cases of birds and animals, thoroughly cleansed the specimens, and re-arranged many of them. He has also set up between 90 and 100 new specimens which have been added to our collection.

The Curator further draws attention to the many duplicate specimens of birds, both American and foreign, fossils, minerals, &c., which, by judicious exchange, would secure many objects which are not in our collection.

The accommodation afforded in the spacious hall of this building is, for the present, more than sufficient, there being room for a much larger collection than we at present possess.

It is to be hoped that members interested in the welfare of this Society will not neglect any opportunity of sending specimens for preservation, so as to render, as far as possible, the collection in the various branches of Natural History complete.

These views would be more fully carried out were the members of this Society to form themselves into sub-branches, each being devoted to some special department of Natural History. This would tend to augment our collection and increase the usefulness of the Society as a whole.

REPORT OF THE EDITING COMMITTEE.

The third volume (1858) of "The Canadian Naturalist; and proceedings of the Natural History Society of Montreal," the editing of which was entrusted to this Committee, has been completed. It has been published in numbers every two month's with much regularity. It contains twenty-five original articles, presented to the Society by its members or correspondents, and prepared expressly for the magazine. These articles, for the most part, pertain to scientific affairs within the Province of Canada, and embrace original investigations and discoveries in the departments of Geology, Zoology, and Botany. Thirteen articles on topics of interest to the Science of this country have been selected from the valuable reports of the Geological survey of Canada, and from the Scientific Journals of Britain and the United States. The chief scientific books which have been published during the year have been either reviewed or noticed, and described with discrimination and care. Numerous scientific gleanings and communications have also been published, which, though not ranking as articles, were yet in great part original. The volume is illustrated with two steel engravings and many original wood cuts of much interest and virtue. For the engravings the editors are indebted to the geological survey, and they desire to acknowledge with thanks, the valuable assistance they have ever received from Sir Wm. E. Logan and his staff.

The number of copies published of each issue is eight hundred and fifty. Free copies are sent to most of the Scientific Societies of Europe and America, for which several exchanges are received and will be acknowledged in their proper place. The editors would, however note, that the number of copies published is greater than the number of subscribers, and therefore urge upon the members and friends of the Society to do what they can to

extend the circulation of the magazine. It is quite indispensible to the promotion of science in this province, and its discontinuance would be felt as a great loss and discouragement. The Society is much indebted to our excellent publishers, Messrs. B. Dawson & Son, for the uniform liberality with which they have provided for the printing and illustrating of the magazine. The editors are also happy to say that the publishers intimate their present determination to undertake all the risks of publication, so long as the Society will provide the editors and contribute the articles.

The first two numbers of vol. iv. have been issued, and the third number is in course of preparation. The editors cannot conclude this report without thanking the contributors for their past services, and expressing a hope that the interest and excellence of the magazine will be sustained in the year to come, and will meet with increased encouragement from the educated people of this province.

PARTICULARS OF COST OF NEW BUILDING IN UNIVERSITY STREET.

Carpenter Work,	$4300 00
Stone and Brick Work,	2700 00
Bricks,	742 70
Plastering,	585 90
Painting,	508 07
Iron Pillars, Castings, and Iron Pipes,	519 00
Gas and Water Fixtures,	400 00
Excavating,	203 73
Piling,	85 60
Seats,	210 00
Stoves and Fixtures,	57 33
Labor, watching, and sundry small accounts,	241 42
Superintendent's commission,	235 00
Fuel,	208 45
	$10997 20

Montreal, 2nd May, 1859.

The contributions to the Museum and Library will appear in our next issue.

THE NATURAL HISTORY SOCIETY OF MONTREAL IN ACCOUNT WITH JAMES FERRIER, JR., TREASURER.

Dr. Cr.

RECAPITULATION.

May 2, 1859.		May 2, 1859.	
To cash paid salaries,	$204 20	By balance in Treasurer's hands,	172 87
" commissions,	30 00	" cash received from L'Institut Canadien Francais, on account of building in Little St. James street,	2000 00
" fuel,	56 40	" cash received from William Nivin, sale of mortgage on building in Little St. James street,	2400 00
" gas and water,	78 15	" cash received from Trustees Cunynghame, sale of balance of mortgage on building in Little St. James street,	3600 00
" interest,	616 00	" cash received from Local Committee, American Association, on account,	800 00
" express charges,	8 79	" do. William Niven, on mortgage of new building in University street,	2000 00
" advertising and printing,	113 83	" cash, life-member subscription, new building,	1620 00
" insurance,	58 00	" cash donations to ditto,	60 00
" notarial expenses,	47 00	" cash subscriptions and diplomas,	491 00
" incidental "	53 73	" balance due Treasurer,	719 43
" Mrs. Blythe's mortgage on building in Little St. James Street,	1600 00		
" in erection of new building in University Street, as per statement,	10997 20		
	$13863 30		$13863 30

E. and O. excepted.

JAMES FERRIER, Jr.,
Treasurer.

Montreal, 2nd May, 1859.

Examined and found correct.

W. H. A. DAVIES, }
HENRY ROSE, } *Committee of Audit.*

May 17, 1859.

MONTHLY METEOROLOGICAL REGISTER, ST. MARTINS, ISLE JESUS, CANADA EAST, (NINE MILES WEST OF MONTREAL,) FOR THE MONTH OF DECEMBER, 1858.

Latitude, 45 degrees 32 minutes North. Longitude, 73 degrees 36 minutes West. Height above the level of the Sea, 118 feet.

BY CHARLES SMALLWOOD, M.D., LL.D.

Day of Month.	Barometer, corrected and reduced to 32° F. (English inches.)			Temperature of the Air. F.			Tension of Aqueous Vapour.			Humidity of the Atmosphere.			Direction of Wind.			Mean Velocity in Miles per hour.			Amo'nt of Rain in inches.	Amo'nt of Snow in inches.	Weather, Clouds, Remarks, &c., &c. [A cloudy sky is represented by 10, a cloudless one by 0.]		
	6 a. m.	2 p. m.	10 p. m.	6 a. m.	2 p. m.	10 p. m.	6 a. m.	2 p. m.	10 p. m.	6 a. m.	2 p. m.	10 p. m.	6 a. m.	2 p. m.	10 p. m.	6 a. m.	2 a. m.	10 p. m.			6 a. m.	2 p. m.	10 p. m.
1	30·304	30·301	30·355	−1·0	16·8	4·2	·034	·053	·038	·84	·53	·73	W. N. W.	S. W.	S. E.	22·24	5·21	0·30	.....	.....	Clear.	Clear.	Clear. Aurora Borealis.
2	004	29·908	29·906	7·9	18·1	20·1	·048	·072	·091	·77	·75	·88	N. E. by E.	N. E. by E.	E. by N.	5·02	3·92	1·05	.....	Inapp.	Slight snow.	C. Str. 6.	C. Str. 10.
3	29·852	694	967	19·5	28·0	10·9	·097	·135	·054	·92	·88	·78	W.	N. E. by E.	W. N. W.	0·22	1·10	12·81	.....	1·10	C. Str. 9.	Snow.	Clear.
4	30·152	30·049	30·098	−5·0	13·0	11·1	·029	·054	·057	82	71	79	S. E. by E.	N. E. by E.	N. E. by E.	0·86	0·35	4·27	.....	0·96	" 6.	C. Str. 10.	Snow.
5	29·941	29·692	29·574	8·0	18·0	26·0	·054	·088	·120	88	92	84	N. E.	N. E. by E.	W. N. W.	13·87	12·57	8·30	.....	.....	" 10.	Sleet.	Rain.
6	760	950	30·125	30·0	22·0	18·3	·148	·084	·079	89	71	78	W.	N. E. by E.	N. N. W.	2·62	24·03	14·51	8·970	.....	" 6.	C. Str. 8.	Clear.
7	30·104	941	29·700	5·7	22·1	33·0	·049	·090	·168	84	78	89	E. N. E.	E. N. E.	S. S. E.	0·20	8·62	6·37	.....	.....	Hoar frost.	" 8.	Snow.
8	29·601	600	724	32·0	30·2	21·0	·162	·142	·096	89	84	85	W.	W. by S.	W.	18·76	10·68	5·46	.....	0·52	C. Str. 10.	" 2.	C. Str. 10.
9	946	30·027	30·181	7·2	13·1	4·0	·049	·068	·040	81	81	80	W.	W.	W. by S.	29·81	14·51	10·86	.....	.....	Clear.	Clear.	Clear.
10	30·271	174	29·914	−5·1	17·6	20·1	·022	·072	·091	68	76	85	S. W.	S. S. E.	S. by E.	3·81	0·74	3·22	.....	0·10	C. Str. 10.	C. Str. 10.	C. Str. 10.
11	29·901	29·960	30·174	19·1	22·0	7·2	·087	·101	·042	84	86	70	W.	W. N. W.	W. N. W.	9·20	14·08	9·60	.....	.....	" 4.	Clear.	Clear. F't Aurora Bor'lis.
12	30·245	30·449	403	−7·5	11·0	5·2	·025	·042	·046	80	55	87	S. by E.	E. by S.	E. by S.	0·12	0·01	0·16	.....	.....	Clear.	C. Str. 6.	Cirr. 4. Imperfect Halo.
13	091	29·800	29·816	6·6	33·0	34·4	·049	·175	·190	88	96	95	N. E. by E.	S. S. E.	S. S. E.	1·22	15·48	9·02	Inapp.	0·70	Snow.	Rain.	C. Str. 10.
14	29·800	510	520	30·0	36·7	34·2	·154	·177	·182	96	89	95	N. E.	S. W.	S. S. E.	0·00	0·11	0·75	0·012	.....	C. Str. 10.	C. Str. 4.	Rain.
15	497	520	720	34·0	36·1	08·6	·182	·191	·129	96	90	82	N. W. by W.	S. W.	W.	0·93	0·96	7·73	0·178	.....	Rain.	" 9.	Clear.
16	861	854	900	21·4	38·1	26·5	·096	·199	·117	85	90	82	W. S. W.	W. S. W.	N. E. by E.	7·56	3·32	14·32	.....	0·94	Clear.	C. Str. 2.	Snow.
17	30·150	30·142	30·268	4·1	21·0	1·2	·058	·080	·034	78	71	71	N. E. by E.	N. E. by E	E. by N.	15·32	3·52	3·30	.....	.....	"	" 10.	Hazy.
18	380	381	443	−6·0	5·2	−6·5	·021	·029	·026	80	55	80	N. N. E.	S.	S.	9·63	0·60	0·20	.....	.....	"	Clear.	Clear.
19	414	29·964	29·797	−10·7	1·9	8·0	·021	·040	·054	77	88	88	E. by N.	N. E. by E.	N. E. by E.	3·22	9·76	8·70	.....	.....	C. Str. 10.	Snow.	Snow.
20	29·794	842	961	12·0	32·2	12·2	·066	·143	·066	90	79	89	W. S. W.	S. W. by W.	S. W.	1·63	2·45	13·72	.....	1·90	" 4.	Clear.	Clear.
21	733	460	354	10·4	15·2	17·6	·059	·070	·088	89	82	92	N. E. by E.	N. E. by E.	N. E. by E.	0·63	1·11	18·37	.....	5·40	" 10.	Snow.	Snow.
22	307	476	864	20·0	21·8	5·6	·097	·090	·055	92	78	61	W. N. W.	W. by N.	W. N. W.	18·37	20·54	21·31	.....	1·10	" 9.	C. Str. 9.	C. Str. 9.
23	940	874	30·004	−2·5	5·8	1·5	·032	·035	·040	83	61	85	W. S. W.	S. E.	S. E.	10·55	0·01	0·01	.....	.....	" 6.	" 9.	C. Str. 6. [Bor.
24	30·070	30·214	428	−8·9	12·4	4·0	·024	·031	·031	79	69	80	W. S. W.	W. S. W.	S. W. by S.	0·00	0·00	0·00	.....	.....	Cirr. Cum. 4.	Clear.	Clear. Zodiac Light. Aur.
25	548	540	545	−14·2	12·1	−9·7	·018	·051	·022	74	70	76	S. S. W.	S. S. W.	W. S. W.	0·00	0·03	0·01	.....	.....	Clear.	Clear.	Do. do. do.
26	205	29·945	29·847	−10·2	13·0	10·6	·022	·039	·062	78	60	89	N. E. by E.	E. N. E.	E. by S.	0·00	0·00	0·00	.....	.....	"	Clear.	C. Str. 10.
27	29·684	700	859	10·1	29·2	21·7	·054	·128	·090	78	77	78	S. by E.	W. N. W.	W. by N.	4·30	7·02	5·83	.....	.....	Snow.	C. Str. 8.	Clear.
28	979	30·049	30·061	10·0	13·7	4·0	·057	·059	·058	79	72	76	W. N. W.	W. N. W.	W.	12·97	12·90	4·41	.....	1·01	Clear.	Clear.	"
29	30·078	090	237	−12·0	11·0	−15·2	·020	·042	·104	76	59	69	E.	S. by E.	E.	0·11	1·36	0·02	.....	.....	"	Clear.	Clear. Aurora Borealis.
30	528	290	211	−17·6	1·8	2·3	·014	·034	·042	70	72	82	E. by N.	E. by N.	W.	14·10	11·43	15·62	.....	.....	"	Clear.	C. Str. 10.
31	29·967	29·680	29·647	18·5	31·0	30·1	·093	·155	·148	92	90	89	E. S. E.	S. S. E.	S. by W.	19·00	15·79	13·22	0·016	2·46	C. Str. 10.	Sleet	" 10.

REPORT FOR THE MONTH OF JANUARY, 1859.

	6 a. m.	2 p. m.	10 p. m.	6 a. m.	2 p. m.	10 p. m.	6 a. m.	2 p. m.	10 p. m.	6 a. m.	2 p. m.	10 p. m.	6 a. m.	2 p. m.	10 p. m.	6 a. m.	2 p. m.	10 p. m.			6 a. m.	2. p. m.	10 p. m.
1	29·662	29·714	29·931	32·0	39·0	21·7	·162	·216	·090	·89	·91	·78	W. S. W.	W. S. W.	N.W. by N.	2·41	5·23	19·90	.....	.....	C. Str. 8.	C. Str. 6.	Clear.
2	30·169	30·225	30·374	7·1	21·6	— 0·4	·045	·080	·036	76	71	82	N. N. W.	S. S. W.	E. S. E.	13·40	0·72	1·04	.....	.....	Str. 8.	Clear.	"
3	416	260	267	— 3·6	11·9	4·1	·031	·051	·036	83	70	72	N. E. by E.	N. E. by E.	N. E. by E.	6·71	8·62	7·18	.....	.....	C. Str. 10.	"	"
4	041	29.942	29·614	8·9	24·1	22·4	·051	·112	·101	77	85	86	N. E. by E.	N. E. by E.	N. E. by E.	10·21	1·54	0·76	.....	0·06	" 10.	" 10.	C. Str. 10.
5	29·621	679	694	26·4	39·2	35·4	·117	·201	·170	82	86	82	N. E. by E.	S. by E.	S. by E.	1·22	1·08	2·12	.....	.....	" 10.	C. Str. 4.	" 6.
6	870	30·000	30·094	82·0	32·1	18·0	·168	·162	·077	89	84	76	S. W.	W. by N.	W. by N.	23·32	8·60	9·77	.....	.....	" 10.	" 4.	" 10.
7	977	29·916	29·474	17·1	36·7	21·7	·072	·191	·090	75	90	78	N. E. by E.	N. E. by E.	W. by N.	14·22	1·46	0·61	0·021	2·16	Snow.	Snow.	Sleet Rain.
8	576	734	859	— 4·1	−1·9	−13·6	·031	·034	·018	83	84	74	W. by S.	W. by S.	W. by N.	36·62	13·26	18·33	.....	.....	C. Str. 10.	C. Str. 4.	Clear.
9	30·139	30·228	30·480	−29·9	−21·5	−32·1	·008	·010	·003	60	63	58	E. N. E.	N. E. by E.	W. S. W.	14·77	8·98	3·03	.....	.....	Str. 2.	Clear.	" Aurora Borealis.
10	614	520	522	−43·6	−14·3	−29·2	·000	·017	·006	47	73	52	W. S. W.	S. W. by S.	S. W. by S.	0·20	0·01	0·05	.....	.....	Clear.	"	" "
11	425	398	523	−37·1	−19·9	−21·6	·001	·012	·011	58	67	64	E. N. E.	N. E. by E.	S. by W.	0·13	0·01	0·02	.....	.....	"	C. Str. 9.	"
12	006	29·976	29·925	−18·4	−10·4	— 5·0	·077	·021	·022	57	70	70	N. E. by E.	N. E. by E.	N. E. by E.	24·61	14·45	11·70	.....	.....	"	Snow.	Snow.
13	29·731	834	30·009	— 5·1	12·2	10·9	·025	·060	·048	66	80	69	N. E. by E.	S. by W.	E. by N.	9·62	0·75	0·48	.....	1·10	C. Str. 10.	C. Str. 10.	C. Str. 10.
14	871	757	29·632	8·5	15·6	17·8	·059	·070	·088	88	80	92	N. E. by E.	N. E. by E.	N. E. by E.	10·86	10·01	14·90	.....	1·10	Snow.	" 10.	Snow.
15	526	127	249	19·7	26·3	21·3	·096	·155	·109	90	96	96	N. E. by E.	N. E. by E.	N. E. by E.	20·27	0·06	7·77	Inapp.	2·30	"	Rain.	Sleet.
16	574	746	979	16·1	19·0	14·3	·079	·077	·076	84	76	91	W. S. W.	W. S. W.	S.	19·95	8·22	10·81	.....	0·24	C. Str. 10.	Snow.	C. Str. 10.
17	856	967	30·157	12·9	16·8	01·0	·063	·068	·038	82	75	85	N. E. by E.	N. E. by E.	N.W. by W.	8·00	12·05	1·35	.....	0·47	Snow.	C. Str. 10.	Clear.
18	30·514	30·214	137	−10·6	15·0	13·5	·021	·070	·072	77	82	91	N. N. W.	S. by W.	S. by W.	0·05	7·73	2·77	.....	Inapp.	Clear.	" 8.	C. Str. 10.
19	048	020	068	12·5	24·2	19·2	·069	·094	·087	90	73	84	S. E. by E.	N. E. by E.	N. E. by E.	1·02	0·00	1·75	.....	Inapp.	Slight snow.	" 8.	" 8.
20	29·925	29·847	29·614	10·6	34·4	32·7	·059	·169	·156	88	84	85	N. E. by E.	S. by E.	S. by E.	0·57	0·01	6·22	.....	.....	Clear.	Clear.	" 6.
21	597	579	724	36·0	38·8	34·2	·197	·201	·169	95	84	85	S. W. by S.	S. W.	S. W.	7·01	5·43	8·67	0·210	.....	Rain.	C. Str. 9.	" 10.
22	821	825	30·085	18·0	18·2	5·0	·082	·080	·041	84	80	74	E. by W.	W.	W. N. W.	9·06	0·35	15·81	.....	Inapp.	Snow.	Snow.	Clear.
23	30·230	30·259	520	— 4·1	8·0	7·4	·031	·048	·051	83	77	87	S. by W.	S. by E.	S.	9·52	0·00	0·92	.....	.....	Clear.	Clear.	"
24	297	274	227	6·4	27·6	17·9	·046	·129	·072	80	88	85	S. by E.	S. E. by S.	S. by E.	1·47	11·16	0·30	.....	.....	C. Str. 6.	Cirr. 2.	" Zod. Light, bright.
25	261	164	107	10·9	29·0	24·5	·060	·136	·111	80	83	86	N. by W.	S. E.	S. by E.	0·81	0·11	0·20	.....	.....	" 2.	Hazy.	" "
26	080	078	037	23·4	39·1	33·2	·106	·180	·156	80	77	85	S. S. W.	S. W. by S.	S. W. by S.	1·20	5·65	15·03	.....	.....	" 4.	C. C. Str. 6.	C. Str. 10.
27	247	312	350	10·5	20·1	10·1	·062	·075	·084	89	70	79	E. S. E.	N. E. by E.	N. E. by E.	8·52	6·20	2·90	.....	.....	Clear.	C. Str. 6.	Snow.
28	29·868	29·762	29·848	11·0	19·0	20·0	·057	·087	·091	79	84	85	N. E. by E.	N. E. by E.	N. E. by E.	30·05	17·00	12·20	Inapp.	7·30	Snow.	Rain.	C. Str. 10.
29	886	900	924	19·1	27·4	24·2	·087	·141	·094	86	98	73	E.	S. by W.	S. S. W.	4·92	0·00	0·20	.....	.....	C. Str. 10.	C. Str. 6.	" 10.
30	978	30·034	30·208	16·2	20·2	13·9	·072	·080	·048	82	75	81	W.	W.	S. W.	17·63	13·30	8·86	.....	.....	Clear.	Cirr. 4.	Clear. Zodiacal Light.
31	30·320	198	220	— 3·9	25·7	8·0	·031	·111	·048	83	80	79	S. E. by E.	S. S. E.	S. S. E.	1·06	0·00	0·00	.....	.....	"	Clear.	"

REMARKS FOR DECEMBER, 1858.

Barometer ..... { Highest, the 25th day, 30·548 inches. Lowest, " 22nd " 29·307 " Monthly Mean, 30.015 inches. Monthly Range, 1.241 "

Thermometer ... { Highest, the 15th day, 36°4. Lowest, the 30th day, −17°9. Monthly Mean, 12°57. Monthly Range, 54°3.

Greatest intensity of the Sun's rays, 40°4.
Lowest point of terrestrial radiation, 17°9.
Mean of humidity, .787. [39 hours and 15 minutes.
Rain fell on 5 days, amounting to 1.176 inches; it was raining

Snow fell on 12 days, amounting to 16.19 inches; it was snowing 70 hours 10 minutes.
Most prevalent wind, N. E. by E.
Least prevalent wind, E.
Most windy day, the 9th day; mean miles per hour, 18·39.
Least windy day, the 24th day; mean miles per hour, 0·00.
Aurora Borealis visible on 4 nights.
Imperfect lunar halo visible on 1 night.
Zodiacal Light visible.
The Electrical state of the atmosphere has indicated light tension.
Ozone was present in rather large quantity.

REMARKS FOR JANUARY, 1859.

Barometer. ..... { Highest, the 10th day, 30·614 inches. Lowest, " 15th " 29·127 " Monthly Mean, 50.021 inches. Monthly Range, 1·477 "

Thermometer. { Highest, the 26th day, 39°4. Lowest, " 10th " −43°6. Monthly Mean, 10°9. Monthly Range, 83°0.

Greatest intensity of the Sun's rays, 40°0.
Lowest point of terrestrial radiation, 43°6.
Mean of humidity, ·792. [21 hours and 38 minutes.
Rain fell on 4 days, amounting to 0.231 inches; it was raining

Snow fell on 10 days, amounting to 15·13 inches; it was snowing 67 hours and 5 minutes.
Most prevalent wind, N. E. by E.
Least prevalent wind, E.
Most windy day, the 8th day; mean miles per hour, 22·73.
Least windy day, the 10th day; mean miles per hour, 0·08.
Aurora Borealis visible on 3 nights.
Zodiacal light visible.
The Electrical state of the atmosphere has indicated high tension.
Ozone was present in large quantity.

MONTHLY METEOROLOGICAL REGISTER, ST. MARTINS, ISLE JESUS, CANADA EAST, (NINE MILES WEST OF MONTREAL,) FOR THE MONTH OF FEBRUARY, 1859.

Latitude, 45 degrees 32 minutes North. Longitude, 73 degrees 36 minutes West. Height above the level of the Sea, 118 feet.

BY CHARLES SMALLWOOD, M.D., LL.D.

Day of Month.	Barometer, corrected and reduced to 32° F. (English inches.)			Temperature of the Air. F.			Tension of Aqueous Vapour.			Humidity of the Atmosphere.			Direction of Wind.			Mean Velocity in Miles per hour.			Amo'nt of Rain in inches.	Amo'nt of Snow in inches.	Weather, Clouds, Remarks, &c., &c. [A cloudy sky is represented by 10, a cloudless one by 0.]		
	6 a. m.	2 p. m.	10 p. m.	6 a. m.	2 p. m.	10 p. m.	6 a. m.	2 p. m.	10 p. m.	6 a. m.	2 p. m.	10 p. m.	6 a. m.	2 p. m.	10 p. m.	6 a. m.	2 a. m.	10 p. m.			6 a. m.	2 p. m.	10 p. m.
1	30·023	30·020	30·091	8·2	20·9	10·2	·048	·088	·054	·77	·67	·78	S. W.	N. by E.	N. by E.	0·15	0·22	0·78	.....	Inapp.	Snow.	C. Str. 6.	Clear. Faint Aurora Borealis.
2	080	006	029	— 8·4	10·0	— 4·3	·021	·054	·024	·62	·78	·65	N. by E.	N. by E.	N. E.	2·98	1·33	0·81	.....	.....	Clear.	Clear.	Clear. Zodiac Light, very bright.
3	29·825	29·719	29·606	— 4·1	13·6	9·0	·027	·093	·057	·70	·81	·88	N. E. by E.	N. E. by E.	N. E. by E.	21·27	19·26	20·20	.....	4·30	Snow.	Snow.	Snow.
4	491	577	780	8·9	26·2	20·1	·057	·117	·191	·89	·82	·85	N. E. by E.	W. S. W.	S. by W.	20·20	2·28	0·21	.....	3·00	"	C. Str. 6.	C. Str. 10.
5	908	30·025	30·233	10·8	19·8	16·3	·048	·081	·074	·70	·77	·83	W. S. W.	S. W.	W. S. W.	1·85	3·63	2·82	.....	.....	Clear.	" 2.	" 10.
6	30·088	034	092	15·0	18·9	6·1	·074	·077	·049	·83	·76	·87	N. E. by E.	N. E. by E.	N. W. by N.	0·86	6·52	0·12	.....	1·72	Snow.	Snow.	Clear. Aurora Borealis.
7	174	234	202	— 3·1	20·3	1·0	·042	·065	·034	·76	·62	·71	W.	S. by E.	E.	0·00	0·00	0·00	.....	.....	Clear.	Clear.	Clear.
8	076	29·930	29·987	— 4·2	20·9	23·0	·029	·085	·106	·80	·78	·86	N. E. by E.	N. E. by E.	S. E. by S.	2·77	0·43	0·03	.....	.....	"	C. Str. 6.	Clear.
9	29·654	501	500	21·4	37·8	31·2	·090	·196	·161	·78	·86	·95	S. by E.	S. E. by S.	W. by S.	0·36	0·00	0·00	.....	3·04	C. Str. 10.	Snow.	C. Str. 10.
10	773	779	30·066	1·0	6·9	— 6·1	·034	·045	·028	·71	·68	·80	W. N. W.	W. S. W.	S. W.	13·16	4·57	7·71	.....	.....	Clear.	Clear.	Clear.
11	30·143	30·460	213	—18·7	13·6	0·5	·013	·057	·036	·60	·72	·84	S. S. W.	S. S. W.	S. W.	0·01	0·01	0·01	.....	.....	"	Clear.	Cirr. 10. Lunar Halo.
12	127	025	161	—10·6	26·0	— 3·5	·015	·105	·031	·58	·75	·80	S. W.	S. S. W.	E.	0·00	0·00	0·00	.....	.....	Str. 2.	Clear.	Clear.
13	141	000	29·894	—23·2	22·2	9·1	·010	·084	·051	·59	·71	·75	S. S. W.	S.	S. by E.	0·00	0·00	0·13	.....	.....	Clear.	Clear.	Light Cirri. Lunar Halo.
14	29·874	29·767	854	10·0	29·1	14·5	·054	·123	·067	·78	·77	·81	S. W.	W. by N.	S. S. W.	3·97	11·40	2·00	.....	.....	C. Str. 10.	Clear.	Str. 4.
15	776	639	541	15·2	22·2	24·2	·065	·095	·115	·74	·79	·88	N. E. by E.	N. E. by E.	E.	0·11	0·16	0·21	.....	0·49	" 9.	Snow.	C. Str. 10.
16	670	737	971	32·4	39·8	24·1	·156	·188	·105	·85	·77	·80	W. S. W.	W. S. W.	W.	3·07	3·08	8·25	.....	.....	" 9.	C. Str. 8.	Clear.
17	30·154	30·140	30·625	13·1	33·5	19·9	·063	·150	·091	·81	·79	·85	E. by N.	N. E. by E.	N. E. by E.	0·00	0·00	4·56	.....	.....	Clear.	" 6.	C. Str. 4.
18	29·814	29·794	29·917	30·4	43·0	37·0	·148	·257	·201	·89	·87	·86	S. S. E.	S. W. by W.	S. S. W.	13·76	2·31	2·17	.....	1·30	Snow.	" 8.	" 4.
19	934	827	664	17·6	41·9	38·1	·078	·203	·208	·83	·80	·90	S.	N. E.	E. S. E.	0·66	0·76	5·10	.....	.....	Clear.	Cirr. Str. 3.	" 10.
20	178	28·872	010	35·7	43·0	52·3	·183	·261	·156	·90	·96	·89	S. E. by E.	S. S. W.	W. S. W.	7·83	6·32	20·70	0·512	Inapp.	Rain, with thunder.	Rain.	Clear.
21	347	29·471	734	10·1	15·0	14·0	·039	·055	·067	·57	·64	·81	W. by S.	W. S. W.	W.	42·90	20·47	21·06	.....	.....	C. Str. 8.	C. Str. 9.	C. Str. 6.
22	855	861	894	13·5	21·4	12·0	·072	·085	·057	·91	·78	·74	S. W.	S. W.	E. N. E.	20·21	2·66	9·63	.....	.....	Clear.	Clear.	Clear. Aurora Borealis.
23	878	797	784	8·9	27·0	28·0	·051	·117	·105	·77	·82	·80	N. E. by E.	N. E. by E.	S. S. E.	1·22	3·16	0·00	.....	.....	C. Str. 3.	C. Str. 10.	C. Str. 10.
24	764	850	30·246	18·1	27·0	10·1	·160	·111	·057	·74	·75	·79	W. by S.	N. N. W.	N. N. W.	0·05	5·47	14·33	.....	.....	" 3.	" 8.	Clear. Aur. Borealis. Zod. Light
25	30·335	30·260	277	— 6·7	14·1	4·7	·021	·057	·043	·62	·72	·75	N. N. E.	E.	N. E.	9·05	4·62	1·08	.....	.....	Clear.	Clear.	Do. do. do.
26	000	29·703	29·624	— 6·6	11·0	21·8	·021	·062	·101	·64	·89	·86	N. N. E.	N. E. by E.	S. S. E.	12·70	13·57	10·75	.....	8·60	"	Snow.	C. Str. 10.
27	779	615	557	10·4	39·0	30·1	·048	·216	·148	·69	·91	·89	S. S. E.	S. S. E.	S. W.	2·86	1·73	0·15	.....	.....	"	C. Str. 9.	Snow.
28	500	697	794	27·6	28·0	16·1	·123	·117	·065	·82	·76	·74	W. by S.	W.	W. by N.	0·28	15·43	9·72	.....	1·10	Snow.	" 9.	C. Str. 9.
...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

REPORT FOR THE MONTH OF MARCH, 1859.

	6 a. m.	2 p. m.	10 p. m.	6 a. m.	2 p. m.	10 p. m.	6 a. m.	2 p. m.	10 p. m.	6 a. m.	2 p. m.	10 p. m.	6 a. m.	2 p. m.	10 p. m.	6 a. m.	2 p. m.	10 p. m.			6 a. m.	2. p. m.	10 p. m.
1	30·161	30·166	30·316	— 7·8	7·9	0·8	·020	·034	·036	·70	·54	·84	W. by S.	W.	S.W. by W.	19·90	11·35	1·22	.....	.....	Clear.	Clear.	Clear. Aurora Borealis.
2	492	422	414	—18·7	23·0	0·0	·013	·089	·036	·69	·72	·84	S. S. W.	S.	S.	19·20	0·56	2·32	.....	.....	"	Clear.	" "
3	234	29·951	29·772	—10·6	17·1	21·9	·021	·068	·102	·77	·75	·92	N. E.	N. E. by E.	S. E.	0·31	7·37	11·67	.....	.....	"	C. Str. 10.	Snow.
4	29·364	250	318	21·7	33·0	29·6	·090	·168	·154	·78	·89	·94	E. S. E.	S. S. E.	N. E. by E.	17·70	5·32	1·75	.....	5·50	Snow.	Snow.	C. Str. 10.
5	354	418	657	26·2	40·6	34·5	·123	·188	·169	·87	·77	·84	N. E. by E.	E. S. E.	W. by S.	11·93	6·31	12·16	.....	Inapp.	C. Str. 10.	C. Str. 10.	" 10.
6	950	30·102	30·114	30·6	35·1	33·0	·142	·177	·156	·84	·85	·85	W.	W.	W. S. W.	10·98	8·40	8·08	.....	.....	" 9.	" 8.	" 10.
7	30·047	29·932	29·973	27·9	38·6	19·0	·123	·186	·087	·82	·81	·84	N. E. by E.	N. E. by E.	N. E.	3·60	3·32	3·40	.....	.....	Str. 2.	Clear.	" 8.
8	29·559	560	669	18·7	31·5	24·2	·077	·149	·105	·76	·84	·80	N. E. by E.	N. E.	N. E.	24·21	21·95	12·82	.....	.....	C. Str. 10.	C. Str. 8.	Clear. Aurora Borealis.
9	780	874	950	12·4	42·9	23·1	·154	·215	·113	·71	·79	·85	W. by S.	S. W. by S.	N. W. by W.	5·47	2·46	0·31	.....	.....	Clear.	Clear.	Clear.
10	30·033	921	30·065	11·2	49·1	26·7	·057	·290	·117	·79	·82	·82	S. by W.	S. E. by S.	S. E.	0·34	0·37	0·27	.....	.....	"	"	Cirri Cumulus 4.
11	014	29·972	29·842	21·4	46·5	38·1	·090	·251	·208	·78	·81	·91	N. N. E.	N. E. by E.	S. E. by S.	4·30	5·33	10·06	.....	.....	"	"	C. Str. 10.
12	29·657	742	804	40·1	47·5	41·6	·225	·291	·228	·91	·89	·87	S. E. by S.	S.	W. S. W.	19·73	14·40	4·76	0·262	.....	Rain.	C. Str. 10.	" 8.
13	860	994	30·110	36·7	47·0	56·5	·184	·283	·184	·85	·85	·85	S.	W. S. W.	S. W.	13·42	14·26	3·80	.....	.....	C. Str. 4.	Str. 2.	" 8.
14	30·152	994	29·879	24·2	44·5	39·7	·109	·231	·210	·83	·80	·86	E. by S.	N. E. by E.	N. E. by E.	0·50	3·20	5·73	.....	.....	" 4.	C. C. Str. 6.	" 10.
15	29·458	439	476	38·2	46·0	57·0	·201	·248	·199	·87	·88	·89	S. E.	S. E. by E.	S. W.	13·00	9·60	5·40	0·230	.....	Rain.	C. Str. 10.	" 9.
16	600	819	990	32·0	36·1	34·1	·149	·170	·162	·84	·80	·84	W. S. W.	W. by S.	S. W.	2·22	20·38	29·45	.....	.....	C. C. Str. 9.	" 4.	Clear.
17	999	967	911	29·4	48·3	37·4	·136	·285	·193	·83	·84	·86	S. S. W.	S. E. by S.	S. E. by S.	5·76	0·77	0·01	.....	.....	Clear.	C. C. Str. 8.	C. Str. 10.
18	650	294	197	36·3	44·7	37·7	·184	·258	·198	·85	·88	·86	E.	N. E. by E.	N. E.	2·33	5·81	3·37	0·217	.....	C. Str. 10.	Rain.	" 10.
19	28·620	28·635	078	42·6	46·1	22·5	·158	·286	·084	·87	·92	·71	S. W.	S. by E.	W. by S.	11·07	6·58	19·72	0·346	.....	Rain.	C. Str. 8.	" 8.
20	29·317	29·528	759	19·8	27·2	26·3	·087	·111	·117	·84	·75	·82	W. by N.	W. by N.	W. by N.	20·98	32·22	16·60	.....	.....	C. Str. 8.	" 9.	Clear.
21	924	932	908	19·7	40·1	30·4	·081	·203	·142	·77	·82	·84	W. by N.	S. W.	S. S. E.	20·20	11·60	0·87	.....	.....	Clear.	Cirr. Str. 2.	Clear. Aurora Borealis.
22	907	850	709	25·5	34·2	30·1	·111	·155	·148	·81	·78	·89	N. E. by E.	N. E. by E.	N. E. by E.	2·45	10·23	10·43	.....	2·90	Str. 4.	Snow.	C. Str. 10.
23	752	798	846	28·2	44·0	36·3	·129	·241	·170	·84	·83	·80	S. W. by W.	W. S. W.	S. S. W.	4·16	5·47	2·28	.....	.....	C. Str. 10.	C. Str. 4.	Clear.
24	771	567	516	26·7	34·4	38·7	·123	·169	·223	·87	·84	·95	N. E. by E.	E. N. E.	E. N. E.	3·22	6·62	8·47	0·640	.....	" 10.	Rain.	C. Str. 9.
25	437	421	547	34·0	52·1	36·5	·182	·270	·191	·95	·72	·89	N. E. by E.	S. W. by W.	S. by W.	18·33	3·51	2·13	0·230	.....	Rain.	C. Str. 4.	" 9.
26	530	544	624	33·2	37·0	32·0	·168	·178	·162	·89	·81	·89	S. W. by W.	S. W. by W.	S. W. by W.	1·46	7·65	2·22	.....	Inapp.	C. Str. 8.	" 6.	" 4.
27	524	567	661	25·2	38·2	32·5	·105	·186	·149	·80	·81	·84	W. S. W.	W. by S.	S. W.	24·22	0·97	12·59	.....	.....	Clear.	Cirr. 3.	Clear. Aurora Borealis.
28	751	671	600	27·4	40·9	34·3	·128	·175	·155	·82	·69	·79	E. N. E.	N. E. by E.	N. E. by E.	0·46	4·08	9·76	.....	.....	Clear.	C. Str. 6.	Clear.
29	597	200	144	34·2	50·1	40·2	·162	·309	·219	·84	·85	·87	N. E. by E.	S. E.	S. W.	8·54	2·73	13·80	0·570	.....	C. Str. 8.	Rain.	C. Str. 9.
30	360	467	550	35·1	40·0	34·1	·156	·167	·155	·85	·68	·79	W. by S.	W. S. W.	W. S. W.	22·80	18·61	14·63	.....	.....	" 8.	C. Str. 2.	Str. 2.
31	534	514	760	30·1	38·5	29·6	·130	·180	·136	·78	·77	·83	W. S. W.	W.	W.	9·57	16·02	20·14	Inapp.	.....	" 4.	" 8.	Clear. Faint Aurora Borealis.

REMARKS FOR FEBRUARY, 1859.

Barometer ..... Highest, the 11th day, 30·460 inches. Lowest, " 20th " 28·872 " Monthly Mean, 29·857 inches. Monthly Range, 1·978 "

Thermometer ... Highest, the 20th day, 43°·1. Lowest, the 13th day, —23°·6. Monthly Mean, 15°·62. Monthly Range, 66°·7.

Greatest intensity of the Sun's rays, 58°·7.
Lowest point of terrestrial radiation, 23°·9.
Mean of humidity, ·776.
Rain fell on 2 days, amounting to 0.512 inches; it was raining 9 hours 15 minutes, and was accompanied by thunder on 1 day.
Snow fell on 10 days, amounting to 23.55 inches; it was snowing 92 hours 45 minutes.
Most prevalent wind, N. E. by E.
Least prevalent wind, N.
Most windy day, the 21st day; mean miles per hour, 28·14.
Least windy day, the 12th day; mean miles per hour, 0·00.
Aurora Borealis visible on 5 nights.
Zodiacal Light visible.
Lunar Halo visible on 2 nights.
The Electrical state of the atmosphere has indicated moderate intensity.
Ozone was present in moderate quantity.

REMARKS FOR MARCH, 1859.

Barometer. ..... Highest, the 2nd day, 30·492 inches. Lowest, " 19th " 28·620 " Monthly Mean, 29.686 inches. Monthly Range, 1·872 "

Thermometer. Highest, the 24th day, 47°·5. Lowest, " 3rd " —11°·6. Monthly Mean, 30°·93. Monthly Range, 59°·1.

Greatest intensity of the Sun's rays, 77°·6.
Lowest point of terrestrial radiation, 11°·9.
Mean of humidity, ·823.
Rain fell on 8 days, amounting to 2.485 inches; it was raining 59 hours and 50 minutes.
Snow fell on 4 days, amounting to 8·40 inches; it was snowing 11 hours and 45 minutes.
Most prevalent wind, N. E. by E.
Least prevalent wind, E.
Most windy day, the 20th day; mean miles per hour, 26·26.
Least windy day, the 10th day, mean miles per hour, 0·32.
Aurora Borealis visible on 7 nights.
A splendid Meteor in N. N. W. at 8·50 p. m., 28th day.
The Electrical state of the atmosphere has indicated very high tension.
Ozone was present in large quantity.
Picus vellosus? woodpecker, seen on the 1st day.
Cornus corone, crows, first seen on the 8th day.
Fringilla melodia, song-sparrow, first seen on the 14th day.
Anser Canadensis, wild ducks (flying south), first seen on the 18th day.

CONTENTS OF NUMBER III.

SMITH, BECK & BECK'S

NEW

Achromatic Stereoscope.

Price in Walnut Wood, - - - - - - - - - - - - $23.00
Do. Mahogany do., - - - - - - - - - - - - $21.00

Stereoscopic Phototographs of the Moon on Glass, from negatives taken by Warren De la Rue, Esq., F. R. S., - - - - - - - - - $6.50

Extract from the "Athenæum," Aug. 28, 1858, page 269.

"The adoption by Mr. CHAPPUIS of the principle of the daylight reflector to the stereoscope was noticed by us in the *Athenæum* for Nov. 7th, 1857. We there made some suggestions for further improvements, with a recommendation to Mr. CHAPPUIS to 'try them.' That gentleman has not done so; but Messrs. SMITH & BECK have not only carried out, they have gone beyond our suggestions,—and from a toy the stereoscope has progressed to an object belonging to science. A few words will enable our readers to understand the improvements that have been made in this justly popular instrument. 1st. By the introduction of achromatic lenses the optical part is greatly improved, thereby increasing the definition and correcting the colour which single lenses invariably show on the margin of the objects. These errors in the unachromatic stereoscope frequently destroy the delicacy of the image altogether.—2nd. By the application of lenses of such a focal length, and placed at such a distance apart as that all shall see without fatigue, which is not the case with those hitherto contrived. But with these improvements in the optical part of the instrument arose the need of greater delicacy in the mechanical contrivances for observing to the best advantage; this led—3rd. To an arrangement whereby any one having the sight of both eyes could see the effect.—4th. A thoroughly steady and substantial stand adapted for a person seated at a table, and allowing of any alteration of position. 5th. A method for holding the slides so that they can be placed and replaced easily and without danger.—6th. Means have been adopted for varying the illumination at pleasure, causing a great variety of very beautiful effects of light and shade, from the cool tints of moonlight to the ruddy glow of the morning sun. And, lastly, a compact case to keep the whole from dust, injury, or exposure. The result is a perfection beyond which it is hardly possible to carry the stereoscope. This perfection is admirably exhibited in the stereoscopic views of the Moon, taken on glass by Mr. HOWLETT, from the negatives obtained by Mr. WARREN DE LA RUE with his equatoreal reflecting telescope of 13 inches aperture and 10 feet focal length. The stereoscopic effect is obtained by combining two views of the moon, taken at different epochs nearly in the same phase, but when the disc is in two different conditions of libration."

SMITH, BECK & BECK'S IMPROVED MICROSCOPES.

Price of the Educational Microscope, ...$65.00 and $96.00
" " Student's " from.....$96.00 to $200.00

Apparatus, &c., Instruments used in preparing and materials in mounting Microscopic objects, or any other article of their manufacture, can be supplied by

FRANCIS CUNDILL, AGENT,
6 Commercial Chambers, St. Sacrament Street,
MONTREAL.

☞ Catalogues forwarded.